Practical Aspects Of The Mastitis Control Program In New York State

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THE writers have been cooperating with dairymen under the New York State Mastitis Control Program since October 1948. Because of the laboratory facilities available, continuing bacteriological studies have been made on thousands of quarters. We now have 33 clients under the program, many of whom have been with us from the start. Although there has been the normal turnover in these herds, this five-year period has provided opportunity to observe carefully the course of a great number of cases of clinical, bacteriological mastitis.

How the Farmer Is Contacted and Instructed

At the present time, all dairymen in our area are aware of the program. If a farmer is experiencing an abnormal amount of mastitis, we suggest when making a call at his farm, that he join the program. If he is agreeable, arrangements are made at that time for a survey. After the application has been accepted by the regional laboratory, a veterinarian is sent out to collect milk samples. One of us accompanies him, especially on the first survey. Not only are individual quarters checked physically and bacteriologically, but a general sanitary inspection is made of the premises. The amount of vacuum and pulsation of the milking machine and lines are thoroughly checked. The fact is stressed that an improperly adjusted machine will sometimes cause an otherwise unexplained flare-up. It is explained that premilking and postmilking sanitation are as important as any other part of the program. It is emphasized also, that an udder that is washed and prepared for milking will milk out cleaner than if the machine is put on without such preparation. Faster milking is important as it gets away from undue congestion. Proper milking procedures have more to do with controlling mastitis than eliminating all bacteria. The educational part of the program is more important to the farmer than treatment of the quarter after mastitis has been diagnosed. Veterinarians can not place too much stress on prevention.

When premilking and milking procedures have been discussed, we check to see if the farmer is using a solution to dip the teats after milking. We have found a pine oil solution to be effective. If the solution is used after milking, it not only will wash off the drop of milk that remains on the end of the teat, but also tends to replace it with a drop of pine oil.

Laboratory Reports Received

After the milk has been cultured, two separate reports are received from the laboratory. One is a summary sheet, and the other a strip sheet. The summary sheet is left with the farmer and gives the grouping of his cows in the order that they should be milked. Clean cows are listed first, with infected cows following in

accordance with severity of abnormal processes or concentration of organisms. The cows secreting abnormal milk are milked last. The strip sheet contains bacteriological report on each quarter and does not go to the farmer. The name or number of each cow is listed, as well as the infecting organism or organisms. In the past, the laboratory recommended treatment for the quarters but of late this matter has been left entirely to the practitioner. An effort is made to get to the premises within a few days after receiving reports to prevent spread of infection. Treatment schedules are arranged to begin promptly.

Treatment of Mastitis

Formerly treatment recommended consisted of penicillin in normal saline or sterile distilled water. Tyrothricin and gramicidin and some other drugs have also been given extensive trial. When the water-in-oil emulsions came out, several were tried and have proved to give best results. Personally, we prefer H.P.® vehicle. It is easier to use and gives better bacteriological results than any other form of treatment. The base is entirely responsible for carrying the antibiotics to the infection. Better penetration and dispersal are factors responsible for superior results.

In our practice, about 70% of the infections are due to *Streptococcus agalactiae*, with a higher percentage of this organism on the first than on any successive survey. Early in our work under this program, 100,000 units of amorphus penicillin were used which appeared to be quite satisfactory. Later dosage was increased to 200,000 to 300,000 units per quarter. Quarters were infused and then retreated 24 to 48 hours later. During the past two years, regimen adopted was the single infusion treatment and re-survey after a brief interval. This method is preferred and the owner is more satisfied. We now employ 500,000 units penicillin and at least 0.25 gm. dihydrostreptomycin in 20 cc. vehicle for both *S. agalactiae* and *S. nonagalactiae* infections. For Pseudomonas infection, polymixin is used in combination with dihydrostreptomycin and penicillin in proportions of 25 mg. polymixin, 0.25 gm. dihydrostreptomycin, and 500,000 units penicillin in 20 cc. vehicle. This formula is used both on Pseudomonas and resistant *S. nonagalactiae* infections. We also use terramycin® on these cases which is either mixed in the vehicle or used in ready-prepared tubes. Terramycin infusions give good results. Hemolytic Staphlococcus infections are not treated unless quarters are actually swollen or there is abnormal milk secreted.

In the six month period from January 1 to July 1, 1953, 632 laboratory cases of mastitis (cultured bacteriologically) have been treated. Although the total percentage of recoveries will not be known until the 30- and 90-day surveys are complete, results look promising. Data condensed from laboratory records indicate exactly what has happened in some herds.

Surveys of *Streptococcus agalactiae* Mastitis

	1st (Qs. Inf.)	2nd (Qs. Inf.)	3rd (Qs. Inf.)	4th (Qs. Inf.)
Herd A	38	0 (3 mo.)	0 (6 mo.)	....
Herd B	26	0 (3 mo.)	5 (6 mo.)	0 (9 mo.)
Herd C	15	0 (5 mo.)	2 (13 mo.)	....
Herd D	45	1 (3 mo.)	5 (7 mo.)	....
Herd E	9	2 (3 mo.)	0 (7 mo.)	....
Total	133	3	12	0

Of 133 infected quarters from five different herds, only 15 were classified as infected over a period of three to 13 months following treatment. At least two cultures were taken during this period. Eleven of the 15 were definite reinfections which cleared up on subsequent treatment. One reason for such good results on these heavily infected herds was that dairymen cooperated in matters of sanitation and good milking procedure.

Mastitis Infusion Tubes

Much has been said pro and con about the use of mastitis tubes. Bacteriological reports are available on two heavily infected herds which were treated with one infusion using H. P. vehicle mastitis tubes. Each 10 cc. liquid based tube contains 500,000 units crystalline potassium G. penicillin (buffered with sodium citrate), 250 mg. dihydrostreptomycin, 500 mg. sulfamerazine and 500 mg. sulfathiazole. Results indicated that of 84 quarters in two herds infected with *S. agalactiae*, all but four quarters were shown to have been freed of the infectious organism after one month. There was 100% recovery in herd 1 and 91% recovery in herd 2. On the basis of these results tubes were dispensed to clients whose herds are under our supervision.

The Farmer's Reaction to Organized Mastitis Control

Whether dairymen like the program is indicated by the fact that practically everyone that has joined the program for mastitis control is

(*Continued on page 437*)

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Studies On Use Of Biologics In Control Of Anaplasmosis†

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MANY attempts have been made to immunize susceptible cattle against anaplasmosis. All successful attempts relied upon premunition with either *Anaplasma marginale* and *A. centrale* (Theiler,[1] Cordier and Menager, [2,3] Omlin,[4] Sergent, Donatien, Parrot and Lestoquard[5,6]), or with attenuated forms of *A. marginale* (Lignieres[7] and Sergent *et al.*[8,9]). All methods of premunition which depend upon introducing the living organism into cattle to produce a nonfatal form of the disease have one serious fault: they produce the carrier state in vaccinated cattle.

Noting that no natural immunity exists in cattle and that an active immunity or tolerance is developed in animals that recover from the disease, it should be possible to develop a similar condition in animals by vaccination without the undesirable carrier state always present in animals that recover.

The authors have unsuccessfully attempted to produce killed organism vaccines which would produce immunity without producing the carrier state in cattle.

During the past five years, or more specifically beginning in 1947, vaccination studies have been carried on at this station. During this period, tests have involved the use of 125 susceptible cattle and some 14 different vaccines.

While the results reported in this study are negative, it is believed that a report of such results is important to prevent expensive repetition in research, aside from practical aspects or hope for an immunizing agent in the near future.

Experimental Procedure and Results

It should be noted that, due to the age and good general condition of animals, no death loss occurred during this series of experiments. Animals were all good quality Hereford steers and heifers and were all ranch raised. They were given no special care, and were not housed except for not more than a few days of extreme weather in any winter. Their winter ration consisted of native pasture and from 1 to 2 lb. per head daily of 40% cotton seed or soybean pellets. They were given hay when the grass was covered with snow.

At the conclusion of each portion of the experiment the group was checked for carrier infection. All animals proved to be carriers.

Since all of the control cattle used in these experiments were treated in the same manner, results from the total of the 18 control animals have been averaged and included in one control group. The average incubation period and low red blood cell count in this combined control group were 22.0 days and 2,850,000, respectively.

Vaccines 1, 2, 3, and 4

These four vaccines were prepared from spleen, spleen and lymph gland, blood, and bone marrow, respectively, collected from animals in acute stage of disease. Solid tissues were ground and weighed, and a buffer solution added. This buffer was made of sodium dihydrogen phosphate and potassium dihydrogenphosphate plus glycerine. The pH of the diluent was 7.4. The material was then passed through a colloid mill and a preservative of 0.5% phenol was added. The blood used for vaccine 3 was prepared in the same manner except that it was not ground or passed through the colloid mill.

Ten susceptible two-year-old animals were used to check each of these vaccines. Eight were given 40 cc. each at the first inoculation, and this was repeated 50 days later. Two animals were held as controls. Thirty days following the second inoculation, each of the test animals was challenged with an inoculation of 2 cc. of blood from a known carrier animal. All proved susceptible.

†All of the vaccines used in this study were prepared by Dr. Herman Farley and Dr. Lon E. Foote, formerly of the Oklahoma Veterinary Reesarch Institute staff at Stillwater.

The gamma globulin (bovine origin) used in these experiments was furnished by Dr. M. A. Schooley, Director, Veterinary Research Department, The Armour Laboratories, Chicago, Ill.

*Pawhuska Field Station, Oklahoma Veterinary Research Institute. Work of the Institute is supported entirely by the Oklahoma Agricultural Experiment Station, Oklahoma A. & M. College, Stillwater.

Incubation periods, as well as the low red blood cell counts, varied with individuals and groups. Averages were:

Vaccine	Incubation period	Low r.b.c. count
1	22.4 days	2,177,000
2	24.6 "	1,852,000
3	27.7 "	2,540,000
4	24.7 "	1,960,000

Vaccine 5

Vaccine 5, a crystal violet blood vaccine, was prepared by adding the aforementioned buffer solution and 0.5% of crystal violet to blood collected from an acute case of anaplasmosis.

Twenty two-year-old animals were used to check this vaccine. Forty cc. doses, repeated in 20 days, were given 16 of the animals; four were retained for controls. Thirty days after the second inoculation, all 20 were challenged with a 2 cc. dose of blood from a known carrier animal. All of these animals proved to be susceptible. The average incubation period of the treated animals was 20 days and the average low r.b.c. count was 2,900,000.

Vaccines 6, 7, and 8

These three vaccines were prepared from the following tissues, respectively: thymus gland and heart muscle, kidney, and lung. The tissues were collected as for vaccines 1, 2, 3, and 4, and were prepared in a similar manner except that eucalytol was used as a preservative.

A group of ten yearling animals was used on the thymus-muscle vaccine with two as controls; groups of five each were used on the kidney and lung tissue vaccines with one in each group as a control.

Forty cc. of vaccine was given each animal except the controls, and the dose was repeated in 21 days. Thirty days after the second inoculation, each animal was challenged with 2 cc. of blood from a known carrier and all animals proved susceptible. Average incubation periods and red cell blood counts were:

Vaccine	Incubation period	Low r.b.c. count
6	22.4 days	2,910,000
7	23.5 "	2,220,000
8	22 "	1,930,000

Vaccine 9

Vaccine 9 was prepared by lyophilizing blood collected from an acute case of anaplasmosis.

Twenty yearling animals were used to check this vaccine. Sixteen received 20 cc. of the vaccine after the diluent was added and the same dose was repeated in 30 days. Four remained as controls. Thirty days after the second inoculation the animals were all challenged with 2 cc. doses of known carrier blood and all proved susceptible to anaplasmosis. The average incubation period for the vaccinated animals was 20 days and the low r.b.c. average was 3,100,000.

Vaccine 10

Vaccine 10 was prepared by adding 1.25 gm. aureomycin to 40 cc. of diluent, and then adding 30 cc. of this solution to 200 cc. of freshly drawn blood from a known carrier. Twenty-four hours later four yearling cattle were given 40 cc. each subcutaneously; one remained for a control. Sixty days later these animals were all challenged with 5 cc. of known carrier blood and all were susceptible. The average incubation period was 21 days; the average low r.b.c. count was 2,120,000 for the treated animals.

Vaccine 11

Vaccine 11 was prepared by adding 20 cc. of diluent to 400,000 units of crystalline penicillin G (potassium), and then adding this to 200 cc. of blood from a known carrier. Twenty-four hours later each of four yearlings received 40 cc. of the vaccine, and one remained for control. The four animals receiving the vaccine contracted the disease. Average incubation period was 29 days and the average low r.b.c. count was 3,130,000. There was, in this instance, a noticeable effect on the incubation period.

Vaccine 12

Vaccine 12 was prepared by administering 3.75 gm. aureomycin in 200 cc. of diluent to a known carrier and drawing 200 cc. of blood from an animal 15 minutes later. Twenty-four hours later four animals received 40 cc. of this blood and one remained as a control. The four animals receiving the vaccine contracted the disease, with the average incubation period being 31 days and the average low r.b.c. count 4,100,000. Again the incubation period appeared long and, in addition, the disease seemed less severe.

Vaccine 13

Vaccine 13 was prepared by using 200 cc. blood prepared as for vaccine 12, to which was added 400,000 units of crystalline penicillin G (potassium) in 20 cc. diluent. Twenty-four hours later, four animals were given 40

cc. each of the vaccine and one remained as control. The four vaccinated animals contracted the disease with an average incubation period of 31 days and an average low r.b.c. count of 3,750,000. These results were similar to those obtained with vaccine 12.

Vaccine 14

To determine the effect of gamma globulin (bovine origin) on the resistance of an animal to anaplasmosis, two four-month-old animals were used.

Animal no. 235 was given 15 gm. and no. 236 given 20 gm. gamma globulin. No. 235 was given 5 cc. of known carrier blood 18 days later. The animal contracted the disease after an incubation period of 13 days. No. 236 was given 5 cc. of carrier blood seven days following the gamma globulin. This animal contracted the disease after an incubation period of 11 days. These two incubation periods average only slightly more than half the average of 22 days in the former controls used with vaccines 1 to 13; however, the course of the disease was normal for this age animal.

Conclusion

While we were able, in a few cases, to vary the incubation period and possibly the course of the disease making it slightly less severe, we were unable to produce an active immunity or tolerance without, at the same time, developing in the animal the carrier state of the disease. Therefore, it appears that none of the methods of preparation described in this study will produce a satisfactory vaccine against anaplasmosis.

Summary

Eight tissue vaccines were prepared from spleen, lymph gland, blood, bone marrow, thymus gland, heart muscle, kidney, and lung. None produced immunity to anaplasmosis.

Lyophilized whole blood from a bovine infected with acute anaplasmosis did not produce immunity against anaplasmosis.

Aureomycin added *in vitro* to anaplasmosis carrier blood prevented infection when the treated carrier blood was injected into susceptible cattle but did not produce immunity against anaplasmosis.

Penicillin added *in vitro* as above with aureomycin did not prevent anaplasmosis infection when injected into susceptible cattle.

Neither aureomycin nor penicillin added *in vivo*, with the blood drawn 15 minutes following the administration of the antibiotic, prevented anaplasmosis infection.

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Mastitis Control Program in New York State

(*Continued from page 434*)

still with us. The farmer is happy with the results, although he may be at times temporarily discouraged. It is expensive, even though there is no charge for the state laboratory work. For the first three surveys, the farmer does not realize that he has so much mastitis. Heavily indurated udders can spell the difference between a high milk producer and a beef cow. Rampant infection can mean economic disaster.

Future of Mastitis Control

We fully support organized mastitis control, believing that veterinarians do not have the time or facilities for making dependable and complete bacteriological studies. Without these, a practitioner is walking in the dark, as he can not possibly know whether he has a clean cow. New antibiotics are available, as is the new knowledge about the disease. Each man to his own task: the bacteriologist, statistician, field veterinarian, practitioner, and dairyman. With all cooperating, losses due to mastitis can be reduced significantly.

Studies On Leptospirosis In Domestic Animals: II. Isolation Of *Leptospira pomona* From Aborted Swine Fetuses*

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PREMATURE births of calves, lambs, and pigs have been noted by veterinary practitioners in outbreaks of leptospirosis in Illinois. The presumptive diagnosis of leptospirosis in these herds has often been supported by positive results of the serum agglutination-lysis test in aborting animals. *Leptospira pomona* infection has been recognized in the United States in cattle by Baker and Little,[1] in hogs by Gochenour, *et al.*,[2] as well as by Bohl and Ferguson[3] and, in horses, by Roberts, York and Robinson[4]. Recently an outbreak of leptospirosis in sheep in Illinois, in which abortions were observed, was confirmed by results of serological and histopathological examinations. These findings have been reported elsewhere by Beamer, Hardenbrook, and Morrill[5]. *L. pomona* isolations from aborted fetuses have not been reported in the United States. Wikerhauser[6] of Switzerland cited work by Gsell in Switzerland, Mochtar and Collier in Batavia, and Johnson in Australia, indicating that each had isolated *L. pomona* from infected swine in cases of "swineherd's" disease. No isolations from aborted swine fetuses were reported.

The purpose of this report is to record the isolation of *L. pomona* from aborted pig fetuses in an Illinois swine herd. Five pig fetuses which a sow had aborted near term were delivered to the veterinary diagnostic laboratory of the University of Illinois on January 26, 1953. A clotted sample of blood from the aborting sow was submitted with the fetuses. Several other abortions had occurred recently in this herd. All animals had previously been found negative to the Brucella agglutination test, which suggested the possibility of another abortifacient agent or agents.

Serological Examination. The aborting sow's blood serum was negative to the plate agglutination test for brucellosis in dilutions of 1:25, 1:50, and 1:100. The agglutination-lysis test for *L. pomona* was positive in a dilution of 1:1000.

Bacteriological Examination. Liver, spleen, kidney, and stomach contents from the fetuses were separately cultured on blood agar, MacConkey's agar, and crystal violet tryptose agar for Brucella and other aerobic pathogenic bacteria. These cultures were negative. Two young 250-gm. guinea pigs were inoculated with a composite physiological saline suspension of liver and kidney tissues from the pig fetuses. Daily rectal temperatures were recorded. The rectal temperature of the one guinea pig was elevated 3.4 F. on the third day after inoculation, while that of the second animal rose 3.2 F. on the fifth day. During the febrile stage, heart blood was drawn aseptically from both guinea pigs and inoculated into several tubes of Schuffner's fluid medium. The tubes were incubated at 28 C. Darkfield examination of the tubes on the fourth day revealed the presence of Leptospirae in pure culture. Other guinea pigs inoculated with this culture developed a leptospiremia. A culture of the organism was sent to Dr. Karl R. Reinhard at the Rocky Mountain Laboratory of the Public Health Service, Hamilton, Montana, for identification. He reported that it was *L. pomona*.

Summary

Leptospira pomona was isolated by guinea pig inoculation of composite liver and kidney from five aborted pig fetuses. The aborting sow was positive to the agglutination-lysis test for *L. pomona* and negative to the brucellosis agglutination test. The herd was free of brucellosis. So far as is known, this is the first isolation of Leptospira from swine fetuses in the United States.

(*Continued on page 442*)

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Intramuscular Injection Of Breeding Ewes With Estradiol Cyclopropionate*

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THE effectiveness of a number of estrogenic substances for inducing estrum and subsequent ovulation has been studied. Many workers have pointed out that such material, if successfully used, would be of value in controlling the breeding of ewes to produce out-of-season lambs and a more uniform lamb crop. One of the more recent synthetic estrogens that has received attention is estradiol cyclopropionate (ECP)®. In a study under field conditions with 77 treated ewes, Venzke[1] found that this compound did not induce definite hormonal stimulation of normal estrum essential for satisfactory fecundation in anestrous ewes. However, symptoms of estrum were observed in 90.9% of these following a single injection of ECP. The use of this agent in the treatment of sterility in cattle,[2,3,4] horses,[5] dogs,[5] and chinchillas[6] has been reported. These have indicated that ECP was effective in inducing estrum, but records on fecundation are incomplete.

This study was made to determine the effectiveness of ECP in inducing estrum and fecundation in ewes during the normal breeding season, and to observe other effects which injection of this synthetic estrogen might cause.

Methods and Materials

Forty-two, two-year-old grade Rambouillet ewes which had lambed the previous year were divided into three lots at random. Lot I (15 ewes) was used as a control lot, lot II (15 ewes) was injected intramuscularly with 1 mg., and lot III (12 ewes) was injected intramuscularly with 2 mg. of ECP. Following the injection all ewes were grazed in the same pasture and had equal opportunity for exposure to the same rams. The ewes were checked for tags. Eight yearling Hampshire rams were sheared prior to being placed with the ewes in the breeding pens from July 18 until October 1, 1952. Since a large number of ewes injected were expected to show signs of estrum, more rams than normal were used in order to adequately expose all ewes. All rams were marked on the brisket with a non-drying oil and coloring material. Ewes were checked in the morning and late evening for color on the rump as evidence of having received the ram, thus indicating the onset of estrum.

TABLE 1. Effect of Injection of ECP on Number and Weight of Lambs Produced

Items	Lot I	Lot II	Lot III
Number of ewes per lot	15	15	12
Treatment	Control	1 mg. ECP	2 mg. ECP
Date injected	None	7-18-52	7-18-52.
Number of ewes lambing	15	14	10
Number of ewes not lambing	0	1	2
Number of live lambs	20	17	12
Percentage lamb crop	133%	113%	100%
Number of twin births	5	3	2
Number of single births	10	11	8
Average birth weight of twins (lb.)	8.8	8.5	9.5
Average birth weight of singles (lb.)	11.1	11.7	11.2

Lambing date, type of birth, and birth weight were recorded for all lambs. Estimated time of conception was calculated using a 150-day gestation period and a 17-day[8] estrous cycle. At the end of the lambing season, all ewes that did not settle were slaughtered and their reproductive tract examined.

Results and Discussion

The injection of either 1 or 2 mg. of ECP was apparently effective in inducing the symptoms of estrum. It may be noted (table 2) that a larger number of the ewes in lots II and III were marked by rams during the first five days following injection. However, a study of the estimated dates of conception would indicate that this was not a normal estrous period and that fecundation did not occur. Evidence

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of this is shown by the greater number of ewes that were rebred in lots II and III than in lot I. Estimation of the approximate date of conception from the lambing date also shows that a much larger number of ewes were settled on first estrum in the control group (lot I) than in the treated groups (lots II and III). Thus, in this trial the use of ECP resulted in a later lamb crop.

The above facts appear to support the statement of Venzke[1] that ECP did not induce the definite hormonal stimulation of normal estrum necessary for satisfactory fecundation.

TABLE II. Observations on Induction of Estrum and Fecundation

Items	Lot I	Lot II	Lot III
Occurence of estrum:			
Number of ewes marked within 2 days	1	6	7
Number of ewes marked within 5 days	3	14	11
Number of ewes marked within 17 days	12	15	12
Number of ewes rebred within 26 days	3	7	8
Estimated time of conception:			
Conceptions between July 18 and Aug. 4	9	1	2
Conceptions between Aug. 5 and Aug. 22	5	2	2
Conceptions between Aug. 23 and Sept. 8	0	9	2
Conceptions between Sept. 9 and Sept. 26	1	2	4

The higher percentage lamb crop in lot I of 133%, as compared to 113% and 100% for lots II and III respectively, would also indicate that this definite hormonal stimulation necessary for fecundation was disturbed following estrum induced by injection of ECP. It would appear that varying lengths of time were required by different ewes to return to normal cycle accompanied by fecundation. The larger number of twin births and the smaller amount of spread in the lambing dates in the control lot would appear to be further evidence that the hormonal relationships involved in fecundation were disturbed. One ewe from lot II and two ewes from lot III did not produce a lamb. These were slaughtered at the end of the lambing season and their reproductive tract examined. No abnormal or diseased condition was noted which would seem to give further evidence that the hormonal relationships involved in fecundation may have been disturbed.

Apparently the injection of ECP had no effect on the birth weight of the lambs. Although there was some variation in birth weights between lots as shown in table 1, these differences were no larger than might be expected due to chance.

Summary

During the 1952 breeding season, 42 grade Rambouillet ewes were used to study the effects of intramuscular injection of 1 and 2 mg. of ECP. This material appeared effective in inducing the symptoms of estrum. Evidence is offered that the hormone relationships involved in fecundation were disturbed following the injection. Apparently the injection of ECP had no effect on the birth weight of the lambs.

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In an age when radar-tracking of speedsters, balloon tests for the inebriated, and electronic tests of fitness and personality are becoming increasingly more common as methods of testimony and discrimination, we are all too apt to exalt the apparatus, retort, and test tube, and ignore the role of the individual.

Machines are insidiously and perniciously usurping the duties that lie in the human domain, and accentuation of this attitude will see them ultimately replacing human interpretation and investigation, and the investigator, needless of resourcefulness, knowledge, and skill, will be demoted to a mere technician.

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Before condemning those who have encroached upon professionals, heed must be paid to reasons for their encroachments. One is purely their own — the desire to enter a field they consider lucrative; the other is the professionals'—they present the opportunities for would-be encroachers.

Effect Of Parasitism On Conversion Of Carotene Into Vitamin A By Sheep: A Preliminary Report†

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CONTROL of gastrointestinal parasitism in sheep presents a constant problem to the sheep husbandryman and to the veterinarian. When parasitism occurs simultaneously with a state of malnutrition combined effects appear to be more detrimental to the sheep than can be accounted for by additive effects of the two conditions. During the course of previous investigations on the value of certain anthelmintics used on feed-lot lambs, it was found that certain stunted lambs failed to fatten even though they were essentially free of parasites on postmortem examination[1].

It has also been observed that some sheep may carry a heavy load of parasites and still make satisfactory weight gains when adequate rations are fed. However, it has usually been found that sheep harboring large numbers of the intestinal round worms are usually in poor condition even when fed well-balanced rations. In an earlier study on experimentally produced vitamin A deficiency, it was found that sheep kept with a low parasite load made good weight gains although they had low reserves of liver vitamin A[2].

Light[3] has presented evidence which indicates carotene is converted into vitamin A in the mucosa of the small intestine of sheep.

These observations suggest that if the mucosa of the intestine of the sheep was damaged by an irritant, rate and efficiency of carotene conversion to vitamin A would be decreased.

This report summarizes results of preliminary trials on conversion of carotene into vitamin A by parasitized and non-parasitized sheep.

Materials and Methods

Experimental animals were two-year-old native grade sheep that had been maintained on carotene low ration since weaning. This ration consisted of dried beet pulp, a mixture of equal parts soybean oil meal and oats, trace mineral salt, and bonemeal, all fed free choice. The stall in which they were housed was bedded with straw.

At the time sheep were placed on the ration they were dosed with the alkaline anthelmintic previously described[4].

Infective filariform larvae were fed to sheep 2, 3, and 4 by stomach tube as shown in table I.

TABLE I

Sheep No.	Infective Filariform Larvae Given Sheep		
1	None		
2	*27,000	—	November 29, 1952
3	*270,000	—	November 29, 1952
4	*18,700	—	October 20, 1952
	*9,000	—	November 2, 1952
	3,900,000	—	November 10, 1952 (Strongyloides)

* Mostly Trichostrongylus sp.

Periodic examinations of fecal samples were negative by the Whitlock method[6].

On January 15, 1953, blood and liver samples were taken for vitamin A analysis by methods used earlier[2,5]. After initial biopsy specimens were taken, each sheep received, by stomach tube, 60,000 units of carotene dispersed in water by means of a wetting agent.

Sixteen hours after dosing, biopsy specimens were taken from sheep 1 and 2 and two hours later samples were taken from sheep 3 and 4. All sheep were slaughtered 40 hours after administering carotene. Parasite load was determined by the method of Goldsby and Eveleth[7]. Vitamin A levels of the liver and serum, and parasite load of individual sheep are summarized in table II.

Discussion

In the non-parasitized sheep, initial liver vitamin A was higher than in three parasitized

†Progress Report on Project Adams 36. The Effect of Intestinal Roundworms on the Utilization of Nutrients by Sheep. Published with permission of the Director, North Dakota Agricultural Experiment Station, Fargo.

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TABLE II. Liver and Serum Vitamin A Content and Parasite Load of Experimental Sheep

No.	Hr.	Liver*	Serum**	Abomasum O.	Abomasum T.	Intestine Tr.	Intestine N.	Intestine Co.	Intestine Ch.
1	0	5.1	36						
	16	14.4	18						
	40	6.2	21	0	0	1	4	0	0
2	0	2.6	18						
	16	6.1	30						
	40	2.4	24	296	3354	4440	0	440	4
3	0	2.7	18						
	18	1.6	24						
	40	2.4	18	1104	92	1535	0	0	0
4	0	3.4	33						
	18	6.2	24						
	40	4.2	36	420	28	2080	240	80	0

* Vitamin A, I. U. per gm.
** Vitamin A, I. U. per 100 ml.
O., *Ostertagia circumcincta*; T., *Trichostrongylus axei*; Tr., *Trichostrongylus colubriformis*; N., *Nematodirus spathiger*; Co., Cooperia sp.; Ch., *Chabertia ovina*.

sheep. This would indicate that this sheep was making more effective use of the carotene supplied by the ration. After drenching with carotene the level of vitamin A rose to 14.4 I. U. per gm. which is more than twice the level of any of the three parasitized sheep. There did not appear to be correlation between serum vitamin A content of the original and the second samples as two sheep showed increases and two decreases.

These data, while on limited numbers of animals and with only moderate parasite loads, do suggest that parasites in the abomasum and small intestine interfere with conversion of carotene into vitamin A.

Summary

Preliminary investigations suggest that even mild parasite loads interfere with conversion of carotene into vitamin A by sheep.

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Toxoplasmosis

The laboratory diagnosis of canine toxoplasmosis (VETERINARY MEDICINE p. 385, Sept. 1953) is very much in line with the work in human pathology. The ubiquitous protozoan parasite, Toxoplasma, may be an infective agent in a wide range of animals—all animals and birds apparently are susceptible. In man, it occurs most frequently as a result of congenital infection, though it may be an acquired condition. In congenital human infection, the newly born child may appear normal at first, later developing chorioretinitis, cerebral calcification, convulsive seizures, etc. In the acquired condition fever, rash, encaphalitis, myocarditis, and pneumonitis may appear. Antibiotics are practically valueless, though sulfadiazine, aided by the pyrimidine drug, daraprim, has definite value in the handling of toxoplasmosis in such laboratory animals as mice and rabbits.

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Investigation into the cause for condemnation of hog carcasses because of icterus revealed that 92% were the result of ascarid infection. The Pathological Division and the Meat Inspection Division of the BAI report 12,924 hogs condemned for icterus in 1952 at all plants maintaining federal inspection, representing a loss of over $500,000.

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Leptospirosis in Domestic Animals

(*Continued from page 438*)

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ADDENDUM. Since preparing the above article, a second isolation of *Leptospira pomona* from an aborted pig fetus has been made at this station.

Experimental Studies With Vesicular Exanthema Of Swine

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PART II

Studies on Stability

Storage Resistance. In an effort to obtain information on storage resistance of this virus, an initial series of tests was made on material stored at ordinary refrigeration temperatures for periods of two and three years in glycerine phosphate buffer in the form of unground vesicle coverings. A series of swine was inoculated intradermally on the snout, and intravenously with a mixture of virus materials which had been stored for three years. Negative results were obtained in all cases. Similar material stored for only two years proved uniformly infective, however.

A similar test of some 1948 A type material stored for two to two and one-half years gave positive results. Material stored for shorter periods has rarely failed to infect swine. Unfortunately, accurate titrations of virus content before and after storage have not been possible. This has precluded any estimation of a change in infectivity on a quantitative basis. These experiments have indicated, however, that this virus is reasonably stable under ordinary refrigerator conditions.

Very little information of an experimental nature is available for other conditions of storage. In one instance, a 10% suspension of ground vesicle coverings in 1% peptone buffer pH 7.4 was viable after six weeks' storage at room temperature, wherein the temperature rose to at least 80 F. for several days. In another instance, a suspension of virus in Sorenson's phosphate buffer survived 24 hours at 37 C. but was not infective at 54 hours.

These preliminary results indicate that this virus probably shows considerable resistance to many environmental conditions, and it is suggested that until evidence to the contrary is accumulated, this virus be considered in at least the same class of resistance as the virus of foot-and-mouth disease.

Reactivation of Virus with Cysteine Monohydrochloride. During intensive work with the 1940 A and B types, a number of virus samples known to be infective for the hamster were found to have lost the ability to infect this animal. This attenuation was believed due to mechanical failure of the refrigerator, a fact not discovered for a number of days during the hottest period of the year. Loss of these samples in particular would have been most unfortunate and it was decided to see if some of them, at least, could be reactivated .

This second and final presentation is a continuation of Part I which appeared in VETERINARY MEDICINE for October 1953, pages 395-400.

The work of a number of investigators had previously indicated that attenuation of virus activity is often paralleled by oxidative changes, and that when these were prevented there was a reduction in loss of infectivity. Gye and Purdy[15] showed that the filtrate from a Rous sarcoma was inactivated in 24 hours at 37 C., but that the addition of a small amount of hydrogen cyanide to the filtrate caused retention of activity for at least three days. Zinsser and Seastone [16] found virulence of herpes simplex virus stored at room temperature could be maintained for at least three weeks when cysteine was added to virus filtrates, compared to only two to four days' storage when cysteine was omitted. These same authors also showed that a concentration of 0.1% cysteine in the filtrate restored some virulence to an apparently innocuous suspension. This work on preservation and reactivation was later duplicated by Perdrau[17]. Similar findings for preservation of viruses by cysteine have been shown for neurovaccinia by Long and Olitsky,[18] and tomato spotted wilt virus, Best,[19] to indicate but a few.

These findings led us to attempt reactivation of six lots of virus consisting of the 1940 A and B types. Filtrates from each lot were prepared from the epithelial vesicle coverings. A 1 to 5% suspension of tissue was made in

Sorensen's phosphate buffer and filtered through a gradacol membrane (400 mμ.). All were initially tested in hamsters and all were found to be non-infective. To aliquots of these filtrates, cysteine monohydrochloride was added to give final concentration of 10 mg. of cysteine for each gram of tissue. Treated filtrates were kept at room temperature for 24 hours and then stored in the refrigerator to await test. Aliquots of the same filtrate without cysteine were similarly held as controls.

TABLE 4. Restorative Effect of Cysteine* on Various Lots of Inactive Vesicular Exanthema Virus

Filtrate designation	Days filtrate exposed to cysteine treatment	Results of hamster inoculations	
		Cysteine treated filtrate	Filtrate untreated
31	4 days	—	—
	13 days	+	—
	19 days	+	—
	33 days	+	—
	38 days	+	—
52 - 53	6 days	—	—
	10 days	+	not done
	12 days	+	not done
	35 days	+	not done
54 - 57	10 days	+	—
	12 days	+	—
44 - 45	14 days	+	—
	23 days	+	not done
52 - C	14 days	+	—
	23 days	+	—
	25 days	+	—
4, 5, 6 C	16 days	—	—
	19 days	—	—
	21 days	—	—
	27 days	+	—
	53 days	+	—

*Cysteine monohydrochloride in a final concentration of 1:1000.
+—Vesicles produced; —No reaction.

At various time intervals thereafter, portions from these aliquots were inoculated into test hamsters. Each animal received a total of approximately 0.5 ml. intradermally on the ventral surface of the abdomen. Results of these experiments are shown in table 4. As indicated, all treated filtrates eventually regained infectivity. The minimum period necessary to reactivate was found to be eight days, and once reactivated remained so over the longest period tested, 262 days.

It should be noted that an experiment such as this simply describes a qualitative phenomenon, wherein the quantitative aspects are completely ignored. It is impossible to say from these experiments what percentage of original infectivity was lost, and therefore what was restored. The authors simply wish to point out the ability of cysteine to restore a measure of infectivity to non-infective filtrates. It is suggested that the addition of cysteine to stored samples of vesicular exanthema virus would be advantageous.

Ability to revive this virus is of considerable interest regarding its survival in nature. It is apparent that anything which would preserve the virus, or even more important, reactivate inactive virus, would materially aid in the chance contact between animal and virus, and thus greatly complicate the epidemiological problems of this disease. It is suggested that in nature cysteine or its many related compounds might play such a role in maintaining vesicular exanthema virus. There appears to be no question that ample cysteine and related substances are readily available under natural conditions. Decomposition of tissues produces quantities of systeine, and various epithelial derivatives such as hair, nails, horn, and wool contain large quantities of cystine which can readily be reduced to cysteine by common bacteria such as *Proteus vulgaris* and *Escherichia coli* (Tarr,[20] Tosoya and Hidetake[21]). These sources could provide the virus with a supply of suitable reducing substances, and perhaps preserve it for long periods during which opportunity would eventually present itself to infect a susceptible animal. If such an assumption is correct it could mean that eradication of this disease, and perhaps others of the vesicular group, from heavily contaminated premises would necessitate particular attention being paid to adequate disinfection procedures.

Miscellaneous Studies

Infectivity as Determined by Dilution. The difficulty of titrating a virus such as vesicular exanthema immediately becomes apparent when the problem of the host animal is considered. Normally, a given virus is titrated on a rather large number of animals, and over a considerable range of dilutions. Various strains of the virus are usually used and often titrations are carried out in several hosts, where available, and by usually more than one route of inoculation. With swine as the only suitable host, we have not been able to approach any but the simplest of the above criteria.

Virus was first filtered through a 488 millimircon gradacol membrane and then absorbed on aluminum hydroxide-gel C. There is little doubt that considerable virus was lost through ultrafiltration and dilutions prepared were therefore somewhat higher than actually indicated. A series of swine was then inoculated with dilutions of 1×10^{-5}, 1×10^{-6}, and 1×10^{-7}. Results of these inoculations are shown in table 5. As indicated, infecting dilution appears to

TABLE 5. Results of Inoculating Swine with Varying Dilutions of Vesicular Exanthema Virus

Animal number	Dilution of virus	Route of inoculation	Results
16	1×10^{-5}	Intradermal	Generalized vesicular exanthema
17	1×10^{-5}	Intravenous	
18	1×10^{-6}	Intradermal	
19	1×10^{-6}	Intravenous	
20	1×10^{-7}	Intradermal and Intravenous	Negative

be about 1×10^{-6}. A similar test carried out with the 1948 A strain of virus gave a lower figure of 1×10^{-3} for infectivity, but was immunogenic at 1×10^{-5}.

The writers are of the opinion that if virus is collected under optimal conditions and properly preserved, high virus titers would be the rule rather than the exception. Much more work on all possible types of this virus is needed to establish reliable figures for a minimum infecting dose for the definitive host.

Recovery of Virus from Blood and Spleen. The question of where and when the virus may be recovered in the body of the host at sites other than those demonstrable by appearance of visible lesions, is one of considerable theoretical and extreme practical importance. We have initiated preliminary studies on this question, leading in time to a complete study of pathogenesis of the virus.

Four test swine were each inoculated with 1.0 ml. of the same virus suspension intradermally into the snout. All animals developed definite evidence of vesicular exanthema 24 hours after inoculation. One animal was sacrificed at this time and the spleen and blood removed. Similarly, one animal was sacrificed at 48, 72, and 96 hours and the same tissues taken and preserved. Aliquots of these tissues were subsequently inoculated into susceptible swine with the results shown in table 6. As indicated, both blood and spleen were positive at 24 and 48 hours after inoculation. Blood was negative at both 72 and 96 hours. The spleen unfortunately could not be tested after the 48th hour. Both positive results with blood and spleen tissue taken at 48 hours were again confirmed at least twice.

Vaccine Prophylaxis and Treatment

Vaccine Therapy

Recovery from experimental vesicular exanthema results in establishment of solid immunity to a second attack by the homologous strain of virus for at least six months. This immune state is present within three weeks after the animal has been exposed to live virus. It is interesting to note that such immune animals will tolerate large doses of virus directly into the snout or intravenously without the slightest sign of even primary infection. However, absolutely no protection is afforded against all heterologous strains which have been studied, and this is proved in the labora-

TABLE 6. Infectivity of Blood and Spleen Taken from Animals at 24, 48, 72, and 96 hr. after Inoculation with Vesicular Exanthema Virus

Animal number	Sacrificed ..... hours after inoculation	Tissue tested	Number of animals inoculated	Results obtained
67	24	Blood	2	Positive
		Spleen	2	Positive
68	48	Blood	2	Positive
		Spleen	2	Positive
70	72	Blood	2	Negative*
		Spleen	Not done	
73	96	Blood	2	Negative*
		Spleen	Not done	

*Note: These four animals, challenged one month later with homologous virus, were all susceptible.

TABLE 7. Preliminary Vaccination Results Using $Al(OH)_3$ Type of Vesicular Exanthema Vaccine

Test swine No.	Vaccine: Route and amount inoculated	Vaccine: Results	Challenge: Route and amount inoculated	Challenge: Results
42	6.0 ml. i.d. into skin of flank; 0.5 ml. i.d. into snout.	Induration with local inflammation for 96 hr. No systemic reaction.	Challenged 20 days later with 0.5 ml. live virus i.d. into snout	No evidence of clinical vesicular exanthema.
43	20 ml. subcutaneously in groin and axillary space; 0.5 ml. i.d. into snout.	Slight swelling at site of inoculation. No systemic reaction.	Challenged 20 days later with 0.5 ml. live virus i.d. into snout.	No evidence of clinical vesicular exanthema.
44	Control	Control	Challenged 20 days later with 0.5 ml. live virus i.d. into snout.	Generalized vesicular exanthema.
45	Control	Control	Challenged 20 days later with 0.5 ml. live virus i.d. into snout.	Generalized vesicular exanthema.

i.d. = Intradermal

tory and reflected in the field by recurrent outbreaks in the same swine population within short periods. This observation of immunity led us to begin preliminary studies in the field of vaccine therapy.

At the present there is no commercially available vaccine. Experimentally we have studied two types of preparations on a limited scale: one a formalin-killed Al $(OH)_3$ treated vaccine patterned after the so-called "Schmidt-Waldmann" type for foot-and-mouth disease vaccine (Schmidt and Hansen,[23] Waldmann and Kobe,[22] and Waldmann *et al.*[24], and the other a crystal violet blood vaccine similar to that used by McBryde and Cole[25] for hog cholera.

The formalin Al $(OH)_3$ killed vaccine consisted of the following:

7% type 1940 B virus tissue suspension	50 ml.
Al $(OH)_3$ Gel type C	250 ml.
50% glycerine in Sorensen's borate buffer pH 8.9	200 ml.
5% formalin	0.25 ml.

This mixture was sealed under vacuum and mechanically mixed for one hour. It was allowed to stand for 48 hours at 25 C. and then stored in the refrigerator at 4-6 C. Sterility tests performed at the end of one week's storage were all negative. The efficacy of this product was initially tested on two swine. The route and amount of inoculum, as well as the results, are shown in table 7.

Results of this first series indicated complete protection against challenge, and side effects produced by the vaccine itself were not objectionable. This experiment was then repeated on a larger group of animals, with only slight variations in the amount of vaccine used and its route of inoculation. Results of this series are shown in table 8. These findings, while not as clear cut as the preliminary series, still indicate a consistent degree of protection against secondary lesions and essentially against systemic effects. This latter point is best illustrated by table 9 showing comparative temperatures of challenged vaccinated, and control animals.

The crystal violet blood vaccine was made as follows:

Infected blood, type 1940 B	150 ml.
3% disodium phosphate	18.75 ml.
0.5% crystal violet solution	18.75 ml.

This mixture was placed in a 37 C. incubator, shaken occasionally and removed 14

TABLE 8. Vaccination Results Using Al(OH)$_3$ Type of Vesicular Exanthema Vaccine

Test swine number	Vaccine: Route and amount inoculated	Vaccine: Results	Challenge* — 20 days later: Route and amount inoculated	Challenge* — 20 days later: Results
46	6.0 ml. i.d. divided doses right and left flank; 0.5 ml. i.d. into snout.	Slight swelling and induration at sites of inoculation. No systemic reaction.	0.75 ml. i.d. into snout and scarification.	No clinical evidence of V.E.
47	4.5 ml. i.d. divided doses right and left flank; 0.5 ml. i.d. into snout.	Slight swelling and induration at sites of inoculation. No systemic reaction.	0.75 ml. i.d. into snout and scarification.	Primary snout lesions only.
48	6.0 ml. i.d. divided doses right and left flank.	Slight swelling and induration at sites of inoculation. No systemic reaction.	0.75 ml. i.d. into snout and scarification.	Primary snout lesions only.
49	20 ml. subcutaneously 10 ml. each groin.	Slight swelling and induration at sites of inoculation. No systemic reaction.	0.75 ml. i.d. into snout and scarification.	Primary snout lesions only.
50	10 ml. subcutaneously 5 ml. each groin.	Slight swelling and induration at sites of inoculation. No systemic reaction.	0.75 ml. i.d. into snout and scarification.	Primary snout lesions only.
51	5 ml. subcutaneously in groin; 0.15 ml. given i.d. in right snout.	Slight swelling and induration at sites of inoculation. No systemic reaction.	0.75 ml. i.d. into snout and scarification.	Primary snout lesions only.
52	Control	Control	0.75 ml. i.d. into snout and scarification.	Generalized V. E.
53	Control	Control	0.75 ml. i.d. into snout and scarification.	Generalized V. E.

i.d. = Intradermal
*Challenge consisted of 0.75 ml. of a 1% tisue sususpension of ground vesicle coverings.

days later. A number of swine were inoculated with this product, the protocol and results of which are shown in table 10. Unfortunately this preparation failed to confirm the degree of protection noted for the other vaccine types. In those instances where two injections were given 14 days apart, only primary lesions were noted on challenge 30 days after the second injection of vaccine. On the other hand, where only one injection was given, no immunity resulted. Even in those cases where secondary lesions were not present following two injections of the vaccine, severe systemic reactions were present. It is felt that not only must a vaccine protect against secondary lesions completely, but it should certainly reduce pyrexia and anorexia and should consider plurality of serotypes if it is to serve its full purpose.

The type of vaccine testing described above does very little more than indicate the fact that some form of vaccine prophylaxis is possible. It should be emphasized, however, that laboratory production of such a vaccine preparation and large scale production are two entirely different problems. Until large scale preparation of antigen by some method other than harvesting vesicle covering materials is found, no field type vaccine will have any practical basis.

Differential Diagnosis

The fact that viruses of vesicular exanthema, vesicular stomatitis, and foot-and-mouth disease produce symptoms which are clinically indistinguishable in the common susceptible host swine, makes differential diagnosis of these diseases particularly important. Clinical likeness of these diseases has led, more by loose association and usage than anything else, to the tacit assumption that the viruses themselves are somehow related. We should like to point out that where comparable facts are known concerning these three viruses such as particle size, host range, and immunological differences they are quite distinct. The practice of borrowing information from one virus and applying it to another without experimental proof is not ideal, but sometimes has to be resorted to until definite information is available for the specific virus in question.

Field differentiation of these diseases is based primarily on the scheme proposed by Traum[1,3] and Crawford[8]. Essentially this involves inoculation of the cow, pig, horse, and the guinea pig by a variety of routes, results indicating which of the three virus diseases is present. Typing of a given virus is done in all three diseases by inoculation of a suspect virus into known type immune animals, results being dependent on finding homologous immune animals to the unknown virus.

This system of animal inoculation is satisfactory as long as live virus is available; speed is not critical, typing of the individual virus is not required, and a new vesicular disease has not arisen. Despite the above shortcomings, this system is the best available at the present time, and where properly carried out will usually allow satisfactory diagnosis to be made. Since so much depends on proper diagnosis, a slightly revised system of animal inoculation technics is presented with detailed methods of obtaining and inoculating suspect virus material.

The majority of outbreaks of a vesicular nature which have occurred in this country over the last two decades have been in swine. Inasmuch as this is the one host highly susceptible to all three virus diseases, and in all

TABLE 9. Temperature Response of Vaccinated and Control Swine Following Challenge* with Venicular Exanthema Virus

Days after challenge	Test pig numbers											
	Vaccinated								Controls			
	42	43	46	47	48	49	50	51	44	45	52	53
—1	39.7	39.7	38.8	38.9	38.6	39.2	38.6	39.6	.....	.....	.....	.....
—2	39.7	39.1	39.2	39.1	38.9	39.5	39.2	39.6	.....	.....	.....	.....
0	39.0	38.7	39.5	39.5	39.7	39.5	39.4	39.9	39.8	39.0	39.2	39.3
1	39.8	38.8	39.9	39.8	39.5	39.9	39.7	39.7	*40.3*	*41.3*	*40.8*	*41.0*
2	39.3	39.9	*40.0*	*40.5*	39.6	*40.0*	38.8	39.3	*41.6*	*41.4*	*40.0*	*40.7*
3	39.0	39.0	39.8	39.3	39.3	*40.2*	39.5	*40.0*	*40.7*	*41.2*	*40.5*	*40.6*
4	39.0	38.7	39.3	39.3	39.0	39.6	38.9	39.3	*40.7*	*40.9*	*40.3*	*40.2*
5	38.8	39.0	39.6	39.7	39.1	39.7	38.8	39.5	*40.6*	*40.3*	39.6	39.7
6	38.8	39.7	39.5	39.3	39.1	39.0	38.8	39.2	*40.3*	39.2	38.6	39.3
7	38.5	38.7	39.3	39.6	39.0	39.8	38.7	38.6	39.8	39.7	38.6	39.9

*Challenge consisted of 0.75 ml. of a 10% tissue suspension of ground vesicle coverings.

probability, the most fertile ground for appearance of another *de novo* vesicular disease, immediate quarantine of all infected and exposed animals should be imposed until adequate diagnostic tests can be performed. The following technics are recommended:

Collection of Virus Material.

a. Carefully select animals showing temperatures of at least 40.6 C. (105 F.) for obtaining virus materials.

b. Remove vesicle covering material only from unruptured vesicles or freshly ruptured ones either on the snout or feet.

c. Collect as much material as conditions permit.

d. Place collected vesicle material in 50% glycerine phosphate buffer prepared as follows:

Glycerins U.S.P. or equivalent ...100 ml.

Sorensen's phosphate buffer pH 7.4 .....100 ml.

Virus material collected in this solution will resist unfavorable conditions for about six hours, but should be placed under refrigeration as soon as possible.

e. Where glycerine phosphate buffer is not available, 1% peptone water, 1% sterile skim milk, or in an acute emergency, plain tap water can be used to aid in preserving the virus.

Inoculation of Test Animals.

a. Whenever possible, test animals and routes of inoculation suggested in table 11 should be followed.

b. Select several large pieces of vesicle covering material and grind as fine as possible, adding 1% peptone water pH 7.4 as the diluent. Glycerine phosphate buffer can also be used as a diluent but field experience has shown that the high viscosity of glycerine renders subsequent intradermal inoculations difficult. Concentration of at least one part tissue to ten of diluent is recommended. Strain through several layers of gauze.

c. Where intravenous inoculations are to be made it is desirable to accompany such field filtrates with 300,000 units of penicillin and 500 mg. of streptomycin intramuscularly.

d. Intradermal inoculations should be made directly into one side of the snout, using a minimum of 0.5 ml. of filtrate, while the other side should be lightly scarified and 0.5 ml. of filtrate briskly rubbed into the lines of scarification.

TABLE 10. Vaccination Results Using Crystal Violet Blood Vaccine Type of Vesicular Exanthema Vaccine

Test swine number	Vaccine: Route* and vaccine	Reactions	Challenge: Route and vaccine	Results
82	i.d. 5 ml.	Slight swelling at site of inoculation.	30 days after vaccination 0.5 ml. i.d. into snout.	Primary lesions
83	i.d. 5 ml.	Slight swelling at site of inoculation.	30 days after vaccination 0.5 ml. i.d. into snout.	Primaries and secondaries
84	i.m. 5 ml.	Slight swelling at site of inoculation.	30 days after vaccination 0.5 ml. i.d. into snout.	Primaries and secondaries
85	i.m. 5 ml.	Slight swelling at site of inoculation.	30 days after vaccination 0.5 ml. i.d. into snout.	Primaries and secondaries
87	i.d. 5 ml. 14 days later i.d. 5 ml.	Slight swelling at site of inoculation.	30 days after 2nd vaccine dose. 0.5 ml. i.d. into snout.	Primary lesions only.
88	i.d. 5 ml. 14 days later i.d. 5 ml.	Slight swelling at site of inoculation.	30 days after 2nd vaccine dose. 0.5 ml. i.d. into snout.	Primary lesions only.
89	i.m. 5 ml. 14 days later i.m. 5 ml.	Slight swelling at site of inoculation.	30 days after 2nd vaccine dose. 0.5 ml. i.d. into snout.	Primary lesions only.
90	i.m. 5 ml. 14 days later i.m. 5 ml.	Slight swelling at site of inoculation.	30 days after 2nd vaccine dose. 0.5 ml. i.d. into snout.	Primary lesions only.

*i.m. = Intramuscular injection
i.d. = Intradermal injection

e. We have found it advantageous to make intradermal inoculations into the mucosa of at least one, and preferably both upper lips. This route of inoculation may show positive reactions where snout inoculations fail or are inconspicuous.

f. Temperatures should be recorded 24 hours after inoculations and continued every 24 hours until clear cut lesions are produced. It is important to remember that lesions may occur without significant febrile reactions.

g. All virus material remaining after inoculation must be saved and recorded until released by competent authority. There is always the possibility of atypical results requiring extensive laboratory retesting of field material, as well as possibilities of new vesicular diseases arising which can only be determined by having such materials available.

At the present time, a highly desirable adjunct to the animal inoculation scheme would be a serological test capable of differentiating these viruses. Currently, an adequate complement fixation test is available for both foot-and-mouth disease (Brooksby[26]) and for vesicular stomatitis (Camargo *et al.*,[27] and Madin and McClain[28]). The writers have attempted complement fixation tests with vesicular exanthema virus for a number of years, but results, while encouraging, have not yet culminated in a clear cut reliable test comparable to that used with either of the other vesicular viruses. A recent publication by Bankowski,[29] *et al.*, indicates that fixation may be possible with swine serum if the procomplementary activity of individual sera are adequately controlled. One of us (S.H.M.) has repeatedly attempted the hemagglutination technic originally described by Hirst,[30] but so far all attempts have proved futile. A recent publication by Michelsen[31] using rat erythrocytes with the foot-and-mouth disease virus, wherein such a test was finally achieved, indicates that exhaustive search for proper animal species may yet yield results with vesicular exanthema virus. At present, consistently negative findings have been obtained using swine, chicken, rabbit, horse, guinea pig, and human cells with this virus.

The problem of detecting neutralizing antibodies has been attempted in connection with the hamster as an experimental host. These results have been encouraging and indicate a possible diagnostic approach. To date, however, it has not been feasible to attempt this on a large scale in swine.

Discussion

Material in the foregoing sections represents most of the knowledge available on this virus to date, and as such, little can be added by extensive discussion. As can readily be seen, only the surface has been scratched, despite the fact that we have investigated this disease for over a decade. Two great problems have continued to confound rapid progress: (1) lack of a suitable laboratory host, and (2) expense of suitable swine-holding facilities. Until either or preferably both of these problems have been overcome such progress as is made will inevitably be slow and piecemeal.

The recent "escape" of this virus from the confines of the state of California to at least 40 of the 48 states poses a new problem for the swine industry of the nation at large, the

TABLE 11. Clinical Response to the Three Vesicular Viruses in the Important Hosts by Various Routes of Inoculation

Test species	Route of inoculation	No. animals needed	Response expected if unknown virus is: V.E.	V.S.	F.-&-M.
Swine	Intradermal snout, lips, plus scarified snout.	2	+	+	+
	Intravenous	1	+	+	+
Horse	Intramuscular	1	— +	+	—
	Intralingual	1	+ —	+	—
Cow	Intradermal snout, upper lip.	1	—	+	+
	Intramuscular	1	—	—	+
Guinea Pig	Intradermal volar surface of plantar pads.	2	—	+	+

+ = Produces typical disease process.
— = No clinical reaction.

—
+ = Disease process rarely occurs.

+ = Usually very mild evidence of vesicular disease approximately 50% of the time.
—

magnitude of which is exceedingly difficult to forecast. Losses experienced from this disease can be serious or mild, depending for the most part on factors about which we know little.

Control of this representative of the vesicular disease family must evolve as it has to some measure in the case of foot-and-mouth disease and vesicular stomatitis, through expanded research and ever increasing knowledge of prophylactic measures.

Summary

Experimental details of studies with vesicular exanthema of swine are reported.

1. General technics relating to both virus and animal inoculation are described.

2. There are a number of antigenic serotypes of this virus, of which two are available at present.

3. Particle size studies indicate the size of this virus to be between 14-22 millimicrons, thus placing it among the smaller virus elements.

4. Attempts to extend host range have so far resulted in failure with the possible exception of the horse and hamster.

5. Virus is viable at refrigerator temperatures for at least two years and at room temperatures for as long as six weeks. Reactivation of apparently inactive virus may be accomplished with cysteine monohydrochloride.

6. Preliminary attempts at vaccine prophylaxis on a laboratory scale indicate that success may be expected using formalin killed $Al(OH)_3$ precipitated preparations.

7. A section on differential diagnosis is included with details of procedure as well as a sligthly revised table of test species.

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Profession and Business

Some that cling tenaciously to the words professional and professional man seem also to shun business and businessman. The dictionary does not seem to share this verbal antipathy, however, and dispassionately defines business as one's rightful work or personal concern, especially one's regular work, occupation, or employment. To be business-like one must display the efficiency, system, etc., desirable in business.

Profession is defined as the occupation to which one devotes oneself; professional means that which is characteristic of or conforming to the standards of a profession; professionalism denotes the opposite of amateurism.

The words business and profession are quite compatible; in fact, professional and business-like are admirable qualities in the same person.

▼ ▼ ▼

Hemophilus gallinarum has been isolated from swollen infraorbital sinuses of geese. Injected into ducks and certain other birds, it did not produce the disease, but was infective to other geese. *Vet. Bul.* 23:136 (April), 1953.

SMALL ANIMAL PRACTICE

Nutritive Requirements Of The Cat: A Preliminary Report*

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THE questionnaire circulated by Dr. Wesley Young for the Special Committee on Feline Medicine of the American Animal Hospital Association included questions concerning the nutrition of cats. A summary of the results reveals a wide divergence of opinion concerning the most effective methods of feeding.

On the question of raw versus sterilized foods, opinion prevailed, two to one, that some raw food was essential. The majority indicated that, for the most part, sterilized diets were quite satisfactory. Opinion was quite unanimous that a low ash diet was essential for prevention and treatment of urinary calculi. The list of ingredients suggested for the preparation of cat food varied widely and included raw and cooked fish, meat, various canned foods, milk, vegetables, glandular tissues, eggs, vitamins, heart, dry meals, cereals, table scraps, dog foods, greens, fruit, baby foods, etc. A cursory examination of this report indicates that cats are being fed largely by rule-of-thumb and on a trial-and-error basis. Palatability was mentioned frequently, as was the distinctive characteristics of the cat to develop fixed eating habits and the instinctive tendency to broaden the food intake by eating a little of one ingredient today and something else tomorrow.

Literature review reveals that few well documented papers have been published which are designed especially to define the basal nutritive requirements of the domestic cat.

Dr. Francis M. Pottenger,[1] a physician of Monrovia, California, has published a profusely illustrated manuscript entitled, The Effect of Heat-Processed Foods and Metabolized Vitamin D Milk on the Dentofacial Structures of Experimental Animals. This work was undertaken by feeding a cat colony a diet consisting of table-scrap meats from a local sanitarium, raw milk, and cod liver oil. The meat scraps returned from the tables had been cooked and the cats eating this diet proved to be poor operative risks; the majority died following surgery, even though technics were considered good. This lead to an examination of the cooked versus raw diet. The author developed a second diet consisting of raw meat scraps collected from butchers supplying the sanitarium. It consisted of muscle flesh, bone, and viscera prepared as follows: ⅔ raw meat and ⅓ raw milk, fortified with cod liver oil. This diet improved the condition of the cats and surgery was more successful. The objective of this work was to get cats to live in order that observations could be carried out on the skeletal structures of the animals, and, secondarily, to define nutritive requirements. In the course of this study, approximately 900 cats were employed which provided an opportunity for rather extensive observations. A review of this work now, with the present knowledge of the probable biological requirements of the domestic feline, explains some of the difficulties which arose from the heat

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processed table scrap meat, raw milk, cod liver oil diet.

A more recent study was conducted by da Silva, Fried, and de Angelis[8]. The purpose of this study was to determine whether the cat was able effectively to convert trytophane into niacin. Eight- to ten-week-old kittens were started on a stock diet until adapted to the

Fig. 1.

laboratory, then they were changed to a synthetic experimental diet. It is important to examine the character of the two rations employed by the Brazilian workers. The stock diet originally fed consisted of crude casein 10, cooked oats 20, cooked potatoes 15, raw beef muscle 20, eviscerated and steamed sardines 20, hog lard 10, bone meal 2, and cod liver oil 3. Apparently, the kittens did reasonably well on this stock colony diet because they were transferred to the laboratory diet which consisted of "vitamin-free" casein 35, gelatin 1, sucrose 48, peanut oil 5, lard 5, salt mixture 5, and ruffex 1. Vitamins were supplied in the following amounts (milligrams per week per cat): Thiamin, riboflavin, pyridoxine, vitamin K, and paraaminobenzoic acid, 3 mg. each; calcium pantothenate, 12; folacin, 1.5; D-biotin, 0.15; inositol, 90; choline, 900; and alphatocopherol, 15. In addition, each cat received 6 ml. of cod liver oil per week. Ascorbic acid had been found in earlier trials not to be required. (This confirms our work with dogs, where we found that ascorbic acid is not required.) This laboratory diet, supplemented with 12 mg. of niacin per cat per week, maintained animals in good health for periods of at least 12 months. If niacin was omitted, however, the young cats ceased growing in ten to 15 days and usually died in four to seven weeks. Adults lost weight on the unsupplemented diet and eventually died. In addition to growth failure, the niacin deficiency symptoms reported were unthrifty coat and severe diarrhea; respiratory diseases frequently contributed to early death in the niacin-deficient young animals. Veterinarians appreciate that these conditions commonly are noted in hospitalized cats. Evidence of anemia and skin or mouth lesions were not observed. Mouth lesions are, however, common in deficient cats. The fact that cats metabolize tryptophane in a manner different from other animals was confirmed by the Brazilian workers. The stock diet on which these kittens were started contained all processed foods except for the raw meat ingredients; however, when the kittens were transferred to the laboratory diet for the 12-month feeding trial, all ingredients were from heat-processed sources and no raw food was given.

Dr. W. F. Irwin,[9] called attention to dysuria

Fig. 2.

in male cats. He stated that two different conditions exist: one, an obstruction caused by calculi; the other, no calculi present, but a cystitis or inflamatory condition of the urinary tract causing changes in the physical properties of the urine. He stated further, that a differential diagnosis can be made by finding evidence of the sandy-like calculi around the penis or in the urethral orifice in a calculi case and, of course, the absence of calculi in dysuria.

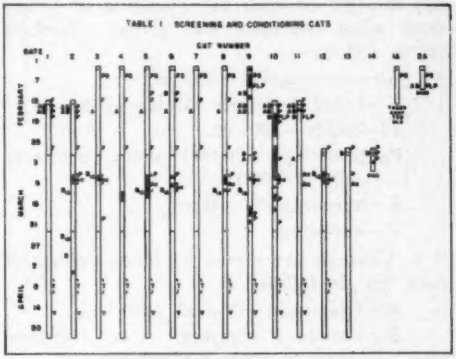
Dr. W. N. Konde[4] commented on this sub-

ject as follows: "The presence of very fine cystic calculi in male cats usually results in stoppage of the urethra and consequent dilation of the bladder." Surgical methods of approach are defined. Dr. Carl Clark[5] stated that urine retention in cats may be due largely to urethral spasms rather than to a blockage of the urethra by stones. He outlined treatment by administration of antispasmodics which was found to be satisfactory.

Dr. Louis B. Huff[6] and Howard C. Taylor[7] have reported high incidence of rachitis occurring in Siamese kittens presented for examination. Fractures of the legs and backs are common. Dietary histories on nursing females and growing kittens would be valuable in making an analysis of this problem.

The need for more accurate information on the dietary requirements of the cat is certainly obvious. In meeting with veterinarians in many sections, one or more questions are usually raised concerning the proper technics for feeding hospitalized cats, especially to aid recovery from infectious diseases and to control or prevent diseases of the urinary tract believed to be directly associated with the ash level of the diet. The importance of vitamin A intake is also mentioned frequently. The writer published a report[8] pointing up certain aspects of feline nutrition, suggesting that the cat probably has a high vitamin B complex requirement, thus accounting for the instinctive desire for fresh liver. Comments were offered on the assets and liabilities of processing. It was suggested that the protein and energy requirements per kilogram of body weight per day were comparable to those reported for the dog.

A common practice in this country is to feed cats on some type of fish product, either canned, fresh, or frozen. Many of these products are labeled as containing whole fish. Evidence has been accumulating suggesting a correlation between this type nutrition and diseases of kidney and bladder, as well as deficiency diseases. A personal investigation was undertaken, and starting at Vancouver, British Columbia, I visited processing plants from that point to San Diego, California, spending about two weeks at Terminal Island, near Long Beach, California, one of the largest fish processing centers in the world. I also observed production technics employed at present along the Atlantic Coast. It was apparent that further fundamental research should be undertaken to define the nutritive requirements of the feline, especially the extent to which whole fish or fish frames, fillets removed, can be processed, labeled and sold as cat food. The results of such feeding should be determined, especially the clinical pathological findings, and the most effective therapy recommended. These studies, under my direction and sponsorship, are in progress at the Raritan Laboratories, Inc., Metuchen, N. J. The following preliminary progress report is based on findings to date.



This work was initiated by ordering a number of cats obtained from Pennsylvania dairy farms. All male cats were selected and castrated at the laboratory. The screening and immunization of these animals were, in my opinion, important and will be described briefly.

Fig. 1. This photograph illustrates the type animal selected, and the technic of weighing. It may be emphasized that experienced attendants are attempting to make pets of these cats so they can be handled easily. The development of a cat husbandry technic which will keep disturbances of metabolism at a minimum is important to the success of this project.

Fig. 2. This photograph illustrates one of the cats from which a blood sample is being obtained. This is an essential procedure and the cats must be trained to permit handling and the taking of blood samples.

Table 1. This table illustrates graphically data which were accumulated from time of purchase of the cats through the screening, immunization, and preliminary feeding.

Explanation — Table 1

1. Each verticle bar represents one cat taken for conditioning.

2. Top bar shows date cat was brought to colony. Cats 1 through 13 were still on test April 23, as indicated by bottom of bars. Cats 14, 1A, and 2A, bottom of bar indicates removal from test.

3. Horizontal lines through bars show dietary regimes.

(a) Top to first line—24-hour starvation period
(b) First to second line—on preliminary food, meat scraps, etc.
(c) Second to third line—on ration 1
(d) Third line to bottom—on ration 2

4. Immunization treatment is shown by letters to right of each bar (position of letters show when treatment was given). Symbols are as follows:

Au—aureomycin—100 mg.
F—feline distemper vaccine—2 cc.
Fl—fluids—200 cc.
P—penicillin—300,000 units, occasionally 600,000.
S—terramycin®—50 mg.
V—vermifuge

5. Vitamins are shown by letters to left of each bar as follows:

A—vitamin A—25,000 units
B—vitamin B complex. 1 cc. (containing five major B vitamins)
B_{12}—vitamin B_{12} solution. 1 cc. (containing 30 micrograms)

6. Diagonal cross stripes on bars indicate the days cats had a fever of 103 F. or higher.

It will be noted from these data that, regardless of the administration of feline biologics and the phophylactic and therapeutic administration of antibiotics and vitamins, these cats passed through an acute contagious, infectious disease characterized by an increase in temperature, general malaise, enteritis with watery stools, some inappetance, and general debility. It is our opinion that these cats are probably immune to the contagious, infectious diseases common to this species and that we can now proceed with the nutrition studies and not have them interrupted by acute illnesses spreading through the colony. From the time of admission, cats were under the veterinary supervision of Dr. Richard C. Lunna who was instructed to care for these cats the same as he would for patients in his regular practice. Hematological studies were omitted because we were not seriously concerned with the disease present but with the livability of the animals and their ultimate resistance to infectious diseases. The collection of blood for differential diagnosis would have necessitated additional handling.

Explanation — Table II

1. The actual amounts of each ingredient in ration 2 are not reported, since adjustments may be needed in this diet before it is in final form.

2. The analysis of ration 1 has been calculated from the literature.

3. Note analysis of ration 2 shows it was much more complete and better balanced than ration 1. This can be seen in ration 2 as follows: (a) less fat, (b) more nitrogen-free extract, (c) more calcium, (d) a good calcium to phosphorus ratio.

4. Ration 2 was further fortified by adding vitamins as follows: To each one pound of ration, 9 drops of cod liver oil, and 3 drops of wheat germ oil.

TABLE II. Composition and Analysis of Diets

Ration 1	Ration 2
1/5 Liver	Horse meat
1/5 Kidneys	Beef trimmings
3/5 Beef trimmings	Liver
	Kidneys
	Milkbone biscuit
	Lard
	Yeast
	Calcium carmonate
	Skim milk

	Ration 1	Ration 2
Moisture	62.2	59.5
Protein	16.6	16.4
Fat	19.3	13.0
NFE	0.9	8.8
Fiber	0.2	0.6
Ash	1.0	1.8
Calcium	0.01	0.84
Phosphorus	0.25	0.72

5. Contrast with the analysis of ration 1 and ration 2 that calculated for the stock ration of the Brazilian workers,[8] which was as follows:

Composition

10 Crude casein
20 Slightly cooked and compressed oats
15 Cooked and mashed potatoes
20 Raw beef muscle
20 Sardines, eviscerated and steamed
10 Lard
2 Bone meal
3 Cod liver oil

Analysis	%
Moisture**	60.0
Protein	10.7
Fat	12.4
NFE	8.9

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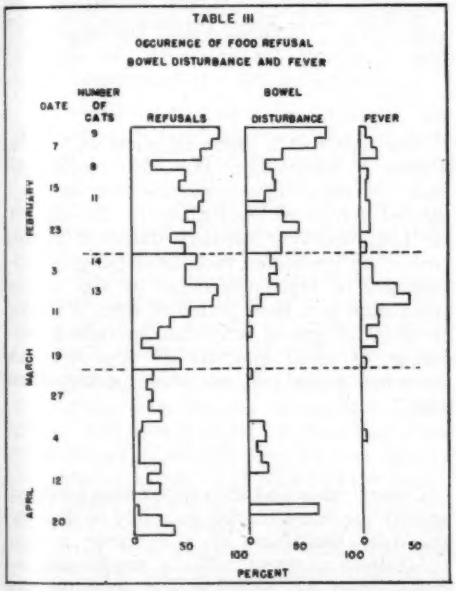
**The workers added water to a fairly dry diet. Therefore, the final moisture is assumed to be 60%.

Fiber	0.2
Ash	1.6
Calcium	0.38
Phosphorus	0.27

Explanation — Table III

Horizontal bars represent percentages of the total animals showing total or partial refusal of food, poorly formed bowel movement, and fever of 103 F. or higher. Bar values shown are the averages for each two-day period. For example, if five of 13 animals refused food on one day and seven on the next, the average for the two-day period would be six and the percent refused 6.13 or 46%. The first broken horizontal line shows the date on which the animals were placed on ration 1, and the second the date on which they were placed on ration 2. The number of cats on experiment is listed in the second column.

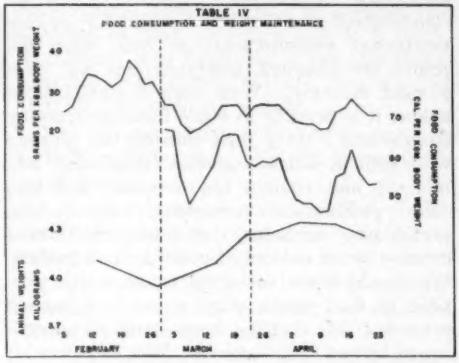
These data clearly illustrate how difficulties with the cats decreased as they slowly recovered from contagious, infectious diseases that spread through the colony, and also the



influence of an adequate diet under such adverse conditions; mortality was low. In some laboratories, 50 to 75% mortality is common under similar conditions.

Explanation — Table IV

1. The data presented are as follows:
   (a) Top curve (upper scale on left hand side) — average food consumption of cats on test, expressed in grams food per kilogram of body weight.
   (b) Middle curve (scale on middle of right hand side) — average food consumption in calories per kilogram of body weight. No calorie factor was available for the preliminary diets, so this curve is shown for ration 1 and ration 2 only.



In calculating the above curves the food intake for each two-day period was averaged and this figure was divided by the average weight at the time of all the animals then on experiment. Food weights were converted into calories using one factor for ration 1 and another for ration 2. The two broken vertical lines show the dietary periods.

   (c) Bottom curve (lower scale left hand side) — average weights of animals at various times during test.

2. The trend shown in food consumption is as follows:
   (a) Food intake falls off sharply on a new diet while cats are getting used to it.
   (b) They then swing the other way, showing a high consumption for a short time.
   (c) Finally, they return to an intermediate plateau, indicating complete adjustment. This plateau drops successively for the preliminary diet, ration 1 and ration 2.

3. Contrast food consumption shown with that for a canned fish cat food. A comparison is made in the following table:

Food Consumption	Canned Fish	Cat Rations 1 & 2
Grams per kgm.	53 - 72	28 - 69
Calories per kgm.	70 - 91	23 - 49

These figures should be regarded with reservation, but they certainly indicate a more efficient utilization of the better balanced cat diets.

Discussion

Why have we elected to proceed in this manner? It is necessary first to establish an essentially disease-free, immune colony of standardized cats that can be used for making nutritional measurements so that when the results are obtained, interpretations will have a valid meaning. With such a standardized colony it is possible to make measurements by comparison. It is then possible to proceed with protein balance studies, determine ash, mineral, and vitamin requirements, and also study pathological conditions; *e.g.*, cystitis, urolithiasis, stomatitis, dermatitis, etc., which develop under controlled conditions of feeding. We should know definitely whether it is possible to feed standardized cats on a canned processed diet that has been sterilized according to known specifications. Will liver furnish the raw food factor if proved essential? The dietary ash levels which cause precipitates to appear in cat urine, possibly inciting the formation of mucus plugs, urethral stoppages, and formation of cystic calculi in cats, must be determined. The quality or biological availability of ash present is important, as well as the quantity present. Absorption and utilization of minerals can have much to do with diseases involving the skeleton, *i.e.*, rickets, osteoporosis, and others. The feeding of a poor quality ash may not only affect the mineral metabolism of the animal, but can also deplete other essential nutrients due to elimination. It is also important to know more concerning the role of vitamin A in maintaining the health of the mucus membranes of the urinary tract and to what extent the proper vitamin A levels will discourage diseases involving this tract. The dietary fat levels are important because of the energy supplied and the effect on palatability and the health of the skin and coat. It should be proved or disproved that the cat does or does not have a high B complex requirement. If the cat has a high B complex requirement, as suspected, and if these animals are fed on high fat diets which encourage reduced food intake, then the B complex vitamin levels must be adjusted proportionately. Breeding studies should be undertaken to determine the dietary stress of reproduction which arises from gestation, lactation, and the growth of the young. It should not be difficult, once the dietary requirements for maintenance are well known, to provide the additional factors needed for normal reproduction. Published data, plus the experience of many veterinarians and nutritionists, having to do with response of cats fed prepared cat feeds, prescription diets (prepared for dogs but fed to cats), together with research reports, should make it possible to formulate a diet that should do a commendable job of meeting the nutritive requirements of the domestic cat.

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The report of a group of scientists — Dr. Luther E. Fredrickson, D.V.M., is senior author — about mass immunization of dogs against rabies as resorted to in the city of St. Louis has one summary statement as follows: "An intensified vaccination program, inoculating a high percentage of the canine population in a short period of time, is shown to be of far greater value than sporadic inoculations of small numbers of dogs over an extended period in the same metropolitan area."

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Corneal ulcer and the concomitant localized opacity are being treated favorably in dogs by the daily instillation of a cortisone acetate ophthalmic ointment. Better results are reported from this ointment than from the use of a cortisone actate solution.

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Prejudice prior to thorough investigation is an iron curtain against knowledge, a barrier against all arguments, and would hold man in everlasting ignorance and destroy the ways of freedom.—*A. C. Ivy, M.D., Ph.D.*

Plasma Transfusion In Dogs

C. E. BILD, D.V.M., Miami, Florida

THERE are situations in small animal practice where the transfusion of blood has proved so effective that no consideration could be given to omitting this therapeutic routine. According to Selye[1], "The therapeutic value of blood or plasma is so much greater than that of most other transfusion fluids that it can hardly be explained entirely by its colloidal osmostic effect. Some workers believe that during stress the body may become depleted in certain labile substances and that only blood or plasma transfusions can restore these".

It has been said of man, and I am sure that this is true also of dogs, that adequate blood and/or plasma transfusions often prevent irreversible shock, or delay the onset of the various advancing stages of shock[2]. Blood and/or plasma are repair solutions and the same may be said of water and electrolyte solutions, and present day plasma extenders.

In operating a small animal hospital, one may keep a number of donor dogs on hand so that the problem of collecting and giving blood to a patient is as simple as the use of water and electrolyte solutions. Practically all infusion needs in routine small animal work may be satisfactorily met by the transfusion of whole blood and the use of electrolyte repair solutions. However, there is a clinical limit to the extent and amount of whole blood and electrolyte solutions that may be used.

In the hands of professional blood bank technicians, it is possible to produce canine plasma and normal serum, and to keep these products at room temperature for use as resuscitative agents as needed. Fibrin formations which occasionally occur in these products are of no consequence as these are administered with a disposable blood recipient outfit. I have used approximately 7,000 cc. of such plasma without reaction problems. The dose may be as much as 10 cc. per lb. of body weight at each infusion and this injected rapidly, if needed, in resuscitative situations. It is always used intravenously. After surgical intervention in case of small bowel obstruction of a Boxer, 35 cc. of plasma were given per lb. of body weight during 48 hours.

Blood is drawn under sterile conditions into ACD bottles. This blood may be collected over a period of days, and then sent to a laboratory where it is centrifuged and the plasma aspirated into sterile vacuum bottles. The product is checked for sterilty.

This plasma product has been employed without reactions, but it has the following disadvantages:

1. Collecting blood over a period of days and then processing resulted in some plasma having a poor color.

2. The procedure is time-consuming. Small amounts of blood are collected and sent to a laboratory to be processed.

3. Mainly, we were having plasma processed on a friendship basis, and this was unsatisfactory.

Doctor Dillon[3] stated at the Pasadena A.A.H.A. meeting in 1952, that frozen plasma was satisfactory. He also said that he did not know of a storage time limitation.

We tried dozens of methods of drawing blood, with and without sedation or anesthesia. We also tried a number of routines for making plasma. We were not satisfied with our product and our problem of "home made" plasma. We had tried collecting blood over a period of a week and then sending this ACD blood out to be centrifuged and brought back for our removing the plasma. This was not satisfactory. We have always questioned the clinical value of poor plasma. We did not like our attempts to make plasma from refrigerated ACD blood left standing in the refrigerator.

It is possible for personnel of a small animal practice to contaminate blood or plasma stored in a refrigerator. The longer such products are stored the greater the danger of contamination. No facilities were available in our practice to check contamination. There is a difference between a possible contamination in half a day and that which may occur after many days storage.

A professional technician from a blood bank laboratory was asked what would be the best time to keep blood with available facilities for making plasma. The answer was five hours. This individual was also questioned about what she would consider the best time

limit for blood storage in my case as I had the facilities to handle canine blood efficiently, the answer was five days. Since that time we have never used ACD blood over five days old. We are all aware that the longer canine blood is stored the shorter is the life and effectiveness of red blood cells.

Since these event, our home-made plasma program has been succesful. We have used about 8,000 cc. and have not had the first mishap. Our procedure of processing canine plasma is simple:

1. Draw blood under aseptic conditions with pyrogen free equipment into a 250 cc. ACD blood vacuum bottle. With the animal in standing position, blood is drawn from the jugular vein. Sedation or anesthesia is not used.

2. Refrigerate five hours, or over night at most.

2. A centrifuge was obtained that holds 4-250 cc. bottles. Blood is centrifuged at 3,000 r. p. m. for 40 minutes.

4. Transfer equipment consists of sterile and pyrogen-free apparatus including an air filter made with a needle and a saline observation tube filled with cotton to let the air in the ACD vacuum bottle, and a transfer set consisting of a long aspirating needle and a short tube with a needle adapted to the opposite end. The plasma is aspirated into a plasma vacuum bottle. This is done slowly and by controlling the flow of plasma from the top of the ACD bottle of blood into the plasma vacuum bottle by guiding the aspirating needle with one hand and controlling the flow of plasma with a pair of forceps with the other hand. Plasma is transferred to plasma vacuum bottles having a capacity of 100, 150, and 200 cc.

5. Label, and place the bottle on its side in the deep freeze.

6. To use, immerse the bottle of frozen plasma in tepid water and agitate until thawed. Never administer plasma except intravenously, and always inject it with a disposable pyrogen free blood dispensing outfit. There is an occasional slight fibrin formation in the plasma.

Although it would be expected in a large series of plasma infusions, such as in this clinical investigation project, no reactions except those of slight allergy have thus far been observed.

We have produced home made normal serum by using plasma vacuum bottles instead of ACD bottles, for drawing the blood. We refrigerate the blood for five hours, then shake well and centrifuge. The only possible difference in the clinical use of plasma and normal serum would be a fraction of 1% more protein because of the fibrin in the plasma. Plasma is preferred because of the ease of preparation.

Conclusion

Practically all situations of fluid need in small animal practice can be handled by use of whole blood transfusions and administration of electrolyte repair solutions. However, both the extent and the amount of their use has clinical limits. Home made frozen plasma has a definite place in small animal work. Plasma is indicated in, and usually employed for, resuscitation. At the present time, in my experience it has not been possible to use commercial distemper serum or commercial normal serum intravenously as a resuscitative agent in shock situations because of reaction rate. As little as 5 to 7 cc. per lb. of body weight of commercial distemper serum or normal serum given intravenously in a period of five minutes in my hands has often caused unfavorable reaction in the recipient. Animals in shock have little margin of safety and infusion reactions are undesirable.

In my experience, there is practically no reaction rate to the use of home made canine plasma or serum, properly processed and frozen, in resuscitative situations.

Acknowledgments

Grateful acknowledgment is hereby made for the assistance and collaboration of Dr. John Elliott, Dr. J. J. Griffitts, and the staff and members of the Blood Bank of Dade County, Miami, Florida, in the preparation of canine plasma. Acknowledgment is also made to Dr. J. H. Yarborough, Dr. Frank Mueller, Dr. Earl Becker, and Dr. Jack Mitchell of the Yarborough Small Animal Clinic, Miami, Florida, for their time and assistance in observing reactions resulting from intravenous infusion of commercial normal and distemper sera.

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There are a thousand and one unwritten ways to show an ethical spirit, and just as many undefinable ways to show an unethical one.

EDITORIAL COMMENTS

Foot and Mouth Disease in Mexico Not Under Control

As stated in a news release of the USDA, dated August 4, 1953, plans agreed upon by the Mexico-United States Commission include evacuation of susceptible livestock from the foot-and-mouth disease quarantined zone. It is reported in *Successful Farming* for October 1953 that about 10,000 animals are to be evacuated to an undisclosed destination and, upon comp'etion of this step in the "control plan", disinfection procedure will begin. Later, the area is to be checked and restocked if found free of contamination.

No animals within a buffer zone, some 15 miles around the quarantine zone, may move without permit during such time as necessary inspections are made. Animals near the buffer zone and within an area of six to nine miles distant will be vaccinated, presumably with vaccine prepared during the previous outbreak and stored for emergency, or purchased from foreign supply sources.

The California Department of Agriculture summarized a statement by Dr. Arthur G. Boyd, assistant director, that the second outbreak of foot-and-mouth disease in Mexico has not been brought under complete control. Limited slaughter operations, inspection, quarantine, and vaccination are proving ineffective in eliminating foci of infection and preventing spread of the disease.

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Bureau of Animal Industry Authority Challenged

A group of licensed producers of veterinary biological products are questioning whether the applicants for special licenses should be required to submit all advertising materials with the application. The BAI is charged with responsibility for licensing for interstate shipment. The issue is that this organization should have no control on usage information to purchasers and that such prerogative belongs to sales promotion managers.

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Neither aureomycin nor terramycin had effect on the course of rabies in white mice when street virus was injected. — *Proc. Soc. Exp. Bio. Med.*, 81:213 (Oct.), 1952.

Farm Advisory Commission

Thirteen of the 15 members proposed for the National Agricultural Advisory Commission have been named by President Eisenhower. One woman, Mrs. Raymond Sayre, president of the Associated Country Women of the World, and 12 men representing farmers and stock-growers, bankers, and businessmen, met in Washington early in September. Three more members will be appointed. The Commission has no authority but serves only in an advisory capacity to the Secretary of Agriculture.

The failure to appoint a veterinarian to this Commission is an astonishing omission, considering the importance of livestock in American agriculture. In these enlightened times, it appears inconceivable that persons in responsible positions as leaders of the industry should fail to seek the counsel and advice of animal disease specialists for the formulation of overall policy matters when the economic burdens imposed by animals diseases are so well understood. It certainly can not be denied that the major limiting factors in profitable livestock operation are the direct and indirect losses due to infectious diseases and parasites that plague our domestic animals. This resolves itself not only in terms of profitable agriculture but also in the availability of adequate meat supplies.

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Hepatitis X of dogs has occurred only during fall and winter months of the past two years. It has been reported only from a few southeastern states. A feature of differential diagnosis of this type of hepatitis is the consistent failure to demonstrate intranuclear inclusions. Histopathological changes in the liver tissue are characteristic and unlike those observed in either infectious canine hepatitis or leptospirosis.—*H. R. Siebold, D.V.M.*

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Dr. Harry E. Kingman, Jr., formerly associated with Wilson & Co., Chicago, has been appointed assistant executive secretary of the A.V.M.A. to fill the vacancy created by the resignation of Dr. C. D. Van Houweling effective September 1, 1953. Doctor Kingman has served the association as treasurer since 1951 and has been active in Assocation work for several years.

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Transparent Dog — Education Exhibit of the Gaines Dog Research Center

The Gaines Dog Research Center will use the first Transparent Dog as an educational exhibit for better understanding of dogs and their proper care and in appreciation of veterinary professional service.

Like the Transparent Woman, feature of the New York World's Fair in 1939, the Transparent Dog was created by the Deutschen Gesundheit - Museum of Cologne, Germany.

The figure is a work of plastic and plexiglas. Every detail of body structure of a Great Dane bitch has been carefully duplicated including skeleton, muscular system, and internal organs. Experts of the Brush Electronics Company have worked out a sound and lighting system which controls and coordinates the figure's "lecture" with its movement, lighting of organs, etc. Two years work have gone into the production of this mounted life-size figure which has been named "Vesta", after the Roman goddess of the hearth.

Urea Supplement in Cattle Feed

Because of its nitrogen content, urea indirectly becomes a source of protein in the feed of cattle. It is not a protein in itself, but is converted to protein under favorable conditions of feeding. Apparently, as much as one-third of the total protein requirements of ruminants can be met by use of urea in the ration. In case of excess urea feeding, or when certain other nutrients are lacking in the ration, toxicity producing bloat and systemic damage may result.

To prevent urea poisoning, proper mixing of urea in the ration is essential and good rations with adequate carbohydrate content in the form of corn or molasses are favorable to maximum propagation of the rumen microorganisms and lessens chances for toxic effects. —*G. K. L. Underbjerg, D.V.M.*

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Health Certificates

In an editorial appearing in Dog World for July, 1953, Editor Will Judy refers to inquiries by breeders and others that concern adjustments for dogs which buyers claim are received in poor physical condition. In many of these cases, the seller forwards a health certificate signed by a veterinarian, or an official form accompanies the bill of lading. Sometimes these animals arrive at destination in such state of ill health that purchasers ask

Harry Miller, director of the Gaines Dog Research Center, points out to a small friend an interesting feature of the Transparent Dog.

for, and receive, a veterinarian's signed affidavit that the dog was in a poor state of health on arrival and indicating a tentative diagnosis. Mr. Judy suggests that the signed statement of the veterinarian at point of arrival is to be preferred as evidence in claims for settlement.

The responsibility of the examinor prior to shipment of dogs or other animals is great. Examinations should be done carefully and a reasonable fee charged for the service. Though such matters as poor coat condition, listlessness, constipation, anorexia, etc. are not considered on health certificates, these and other observations and findings must be evaluated in assessing the state of health of the individual. Though the fact that an animal does arrive in poor health does not disprove the statement on the certificate that the animal was in normal health when shipped, it is embarrassing to the examiner when these controversies arise. It is also difficult to prove negligence on the part of the transporting carrier.

Exercise of care is most important and refusal to issue certificates whenever the condition of health may be questionable is a service to owner and purchaser.

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Minnesota Pigmy Pigs

Researchers of the University of Minnesota at the Hormel Institute, located on the large estate of Mr. Jay C. Hormel, meat packer of Austin, Minnesota, have developed in less than four years, a miniature pig to serve investigators of human disease. These small pigs weigh under 50 lb. at six months of age and thus provide an easily handled laboratory animal.

According to an Associated Press release, these animals were developed by selective breeding crosses of the Alabama "guinea" hog and a wild boar from Catalina Island. Louisiana "Piney Woods" pigs were introduced later in the cross-breeding and inbreeding program. The smallest pig so far raised is a six-month-old boar weighing 25 lb.

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In a report on lamb feeding investigations at the Kansas station the unfavorable influences of stilbestrol were pointed out. Examination of lambs receiving two implants of the synthetic estrogen revealed among other observations an enlargement of reproductive organs of wethers and almost complete closure of the lumen of the urethra.

Dr. C. D. Van Houweling Resigns A.V.M.A. Post

Dr. C. D. Van Houweling

Dr. C. D. Van Houweling, executive secretary of the A.V.M.A. for the past three years, resigned his position effective Sept. 1, 1953, to join the staff of the College of Veterinary Medicine at the University of Illinois, Urbana. He will hold an instructorship in clinical medicine and take graduate training in veterinary pathology and hygiene.

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Changes in the methods of electing officers of the A. V. M. A. was considered before the House of Representatives at the recent Toronto meeting. Exact procedures remain to be worked out but the establishment of a Nominating Committee has been proposed and election by mail ballot. This plan will make possible participation by all members in selection of officers regardless of whether they are able to attend annual conventions.

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Limited experiments fail to show any increase in rate of gain for cattle fed trace minerals. Experiments do show, however, that animals fed trace minerals recover more quickly from effects of parasitism, subsequent to treatment, than do animals on ordinary rations.—*M. J. Swenson, D.V.M., Ph.D., and G. K. L. Underbjerg, D.V.M., Ph.D., Manhattan, Kans.*

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Inhalation chloroform anesthesia has served us best as an equine anesthetic agent. It is used in most surgical patients presented for castration, enucleation of the eye, and dentistry.—*A. G. Madden, Jr., Madeira, Ohio.*

Doctor Collins Named Veterinary Medical Director

Dr. J. H. Collins has been appointed to succeed the late Dr. H. E. Moskey as veterinary medical director in the Division of Medicine, Food and Drug Administration, Washington, D. C.

Dr. J. H. Collins

Doctor Collins received his D.V.M. degree in 1935 from the College of Veterinary Medicine at Ohio State University. Upon graduation, he joined the professional staff of the Bureau of Animal Industry, performing duties in the Brucellosis and Tuberculosis Eradication, Meat Inspection, and Virus-Serum Control Divisions. In 1942, he transferred to the Food and Drug Administration to conduct controlled scientific tests for evaluating livestock and poultry remedies in the enforcement of the Federal Food, Drug, and Cosmetic Act. He had been assistant veterinary medical director since 1946.

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It should be recognized that garbage has a definite economic value and is not merely waste material, the satisfactory disposal of which must be costly and unprofitable. Its highest economic value is probably as hog feed. — *J. D. Long, B.S., M.S., Washington, D. C.*

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Radioactive penicillin has been used by A. R. Drury and associates to trace distribution of the drug when infused into the udder of a cow suffering from mastitis. It is apparent that penicillin is absorbed into the blood and filtered out by the kidney, even when administered intramammarly.

Hypodermic Syringe a Century Old

Just 100 years ago a French physician, Charles-Gabriel Pravaz (1791-1853), successfully injected intravenously, a solution of iron perchloride into the venous circulation of a horse as a cure for abnormally distended blood vessels. This statement is based on a feature story prepared by Dr. Paul H. Fluck that appeared in *Collier's*, May 30, 1953.

Doctor Pravaz's instrument was a crude metal cylinder having a screw plunger which forced the contained fluid through a sharpened steel tube. Tests were conducted at the National Veterinary School, Lyons, France. The experimental work on horses was apparently harmless and the therapy was claimed to be useful. Properly employed, iron perchloride was a satisfactory blood coagulant. It was tried in human patients, first with good but later with disastrous results, *i.e.*, fatal infection. The procedure was discredited publicly and the originator died in disgrace, branded a murderer by his contemporaries, and believing his idea of intravenous therapy was a failure.

A few years later, a Scots physician used a similar crude syringe for injecting pain-killing drugs directly into the blood stream. Pravaz's syringe was also used by Pasteur in his experimental work with anthrax and rabies.

Within a few years of the inventor's death, hypodermic syringes and needles were being manufactured in Europe and the United States. By 1895, an all-glass syringe equipped with a well-fitting glass plunger was developed which could be sterilized by boiling. During the past half century, spectacular advance has been made in the development of chemotherapeutic and biological agents designed for administration by injection and further improvements have been made in syringes and needles.

What Doctor Pravaz believed a failure has proved to be a miracle during a brief century of progress in medicine. Those who use a hypodermic syringe daily accept without question the modern precision and quality instrument now available as a necessary tool for effective treatment, control, and prevention of disease.

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In spite of suggested disadvantages of feeding steers and heifers antibiotics at the feeding level, some recent tests indicate that increased gains are possible in dry-lot-fed animals by adding antibiotics to rations.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Diagnostic Technic for Leptospirosis

Research and current literature indicate that in the diagnosis of suspected leptospirosis the serological test generally used is that known as the microscopic agglutination-lysis test. In horses, cattle, and swine *Leptospira pomona* is by far the principal etiological factor. However, there are other agents of the Leptospira group, and since the serological test is species specific, a variety of antigens is required when broad surveys are to be made. The agglutinating antibodies are present for several years in animals that have carried the infective agent. The test is said to be so sensitive that specific antibodies may be detected in serum dilutions up to 1:1,000,000. The compliment-fixation test is also used and is equally reliable, though more involved.

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Vaccination of Pregnant Sows

We are now hearing rumors that the use of modified live-virus hog cholera vaccines on sows and gilts during the first six weeks of pregnancy results in weaker and smaller litters. We recall that in the early days of serum and virus vaccination the same charge was made. However, preliminary tests at the Hormel Institute do seem to indicate some support for the "weaker and smaller litter" assertion.

In view of the fact that most gilts and sows are cholera immune because of earlier vaccination the charge, if substantiated, does not seem to be of serious import. If cholera appears in non-immune sows or gilts during early pregnancy, a safe procedure would be to tide them over the pregnancy period with hog cholera antiserum. Permanent immunity may be conferred safely at a later date.

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It is reported from a large scale feed lot in Nebraska that from 0.5% to as high as 1.5% of sulfur added to the ration of lambs for a period of not exceeding 72 days prevented the development of naturally acquired coccidiosis. Larger amounts caused some diarrhea and lesser gains in weight.

Preliminary results of research with urea are not yet sufficiently advanced to justify a positive statement about its value or role in cattle feeding. In enthusiastic quarters it has been designated the "new wonder food." Under natural conditions urea is the chief nitrogenous constituent of urine and it is the form under which the nitrogen of the body is given off. Clinically, it is a uric acid solvent with diuretic properties, and is toxic in higher than therapeutic doses.

As an addition to the protein ration—soybeans, linseed, alfalfa, etc.—it is of value only to ruminants; it is of no value to monogastric animals. It has been shown that urea increases the activity of microorganisms normally in the rumen so that much of the cellulose portion of the ration is converted into digestible food. It is stated that it takes 250 lb. of soybean meal to obtain 100 lb. of protein, but that when urea is added, a much larger amount of available protein results. However, urea is toxic and can easily be used in excess. One researcher states that the daily amount of urea fed in the ration must not exceed 0.1 lb. per animal per day, and that more than 0.25 lb. per animal per day is less efficient than smaller quantities. It should be mixed in an otherwise balanced ration. Also, since urea has no energy value, carbohydrate must constitute a portion of the ration.

It is of historic interest that in 1828 Wohler synthesized urea by heating ammonium cyanate. It was the first formation of an organic substance from inorganic materials.

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Raising puppies in shady, moist kennels, with limited exposure to the sun is almost certain to be disastrous if parasite-infected bitches have occupied such quarters. Pups will be infected with ascarids and hookworms from the day that they are whelped. When two or three weeks of age, such an animal will quite likely exhibit nutritional disturbances so severe that even administration of ordinary anthelmintics is hazardous. In instances of this nature, blood transfusion plus administrations of liver extract and vitamin B_{12} are recommended.

POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.
Frederick, Maryland

25th Annual Meeting of Northeastern Conference of Laboratory Workers in Pullorum Disease Control

The Northeastern Conference of Laboratory Workers in Pullorum Disease Control was organized in 1928 and held its initial meeting at Amherst, Mass. The original purpose was to standardize procedures for eradication of pullorum disease in New England. The Conference has grown from its first representation of six states to one now representing the northeastern states and several Canadian provinces. At the 1953 meeting in June, at Amherst, the attendance was about 100, as compared to less than 20 at the 1928 meeting.

The Conference has accomplished many of its original aims in its 25 years of existence, and because of the lessened need for emphasis on pullorum disease, much of the time is now devoted to current emergency needs in poultry disease control. This was indicated by the fact that only five of the 26 presentations during the two days of the 1953 program concerned pullorum disease. Following the trend of current poultry disease research, so-called chronic respiratory disease (CRD) of poultry received maximum emphasis. The present interest in this disease was further emphasized by an additional day being devoted to CRD by a BAI regional sponsored program.

The 25th anniversary of the founding of the Conference was featured at a banquet. At this banquet, certificates of appreciation were presented to the nine living charter members. Five of these were present at the banquet. They are Dr. Lea F. Rettger, Yale University; Dr. J. B. Lentz and Miss Miriam K. Clarke, University of Massachusetts; Dr. E. R. Hitchner, University of Maine; and Dr. W. R. Hinshaw, Frederick, Md. The other four, Dr. Norman Pyle, Dr. E. M. Gildow, Dr. E. F. Sanders, and Dr. J. C. Weldon received recognition *in absentia.*

One of the significant reports of the meeting was that giving the history of pullorum disease testing of the states and provinces which cooperate in the Conference. Several have had active programs for over 25 years. Massachusetts and Maine each reported from 1921 to 1953, and their results are examples of progress made. Massachusetts tested 24,718 birds in 1921 and culled 12.5% of them as reactors. In 1953, Massachusetts tested 1,155,359 and only had to cull 0.4%. Maine has a comparable record, having tested 2,730 birds in 1921 with 22.3% reactors, while in 1953, 1,365,-314 birds were tested with only 0.027% reactors. Every state and province in the group of 16 reporting had less than 0.4% infection in the 1952-53 season, and one province, Nova Scotia, tested 81,397 birds without finding a single reactor. A close second was New Hampshire which reported 1,512,219 birds tested with a single reactor in 502 flocks. Twenty-five years ago the percentage of reactors found ranged from 2.5 to 22.3%. These examples indicate the magnificent progress which has been made in programs for eradication of pullorum disease in the past quarter of a century. As stated many times before on this page, there is no longer any excuse, with such a high percentage of pullorum-free flocks now available, for any poultryman to buy chicks or poults from hatcheries that cannot guarantee stock from pullorum-free sources.

At another time, I will review the papers on CRD (chronic respiratory disease) given at the Conference. These and the data quoted above have been published in the Proceedings of the 25th Annual Meeting of the Northeast Conference of Laboratory Workers in Pullorum Disease Control, June 16 and 17, 1953, Dept. Vet. Science, University of Massachusetts, Amherst.

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According to W. T. McAllister, Delaware Agricultural Extension Service, 5,000,000 to 12,000,000 birds annually are damaged by bruising during catching, loading, and hauling of birds, and handling them in processing plants. This amounts to as much as $600. daily average loss per dressing plant (*The Poultryman,* June 12, 1953). Veterinarians can contribute to the reduction of such losses by advising clients on proper methods of loss prevention.

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Fire is one of the largest single causes of death in poultry. Chief among the causes of fire on poultry farms is poultry brooding equipment.

VETERINARY PARASITOLOGY

A. O. FOSTER, B.A., M.A., Sc.D.
Beltsville, Maryland

A Parasite Robs its Host of a Vitamin

The fish tapeworm, *Diphyllobothrium latum*, which for many years has been uncertainly associated etiologically with a kind of pernicious anemia of man that is common in some populations, has been found to absorb the extrinsic factor, vitamin B_{12}. Experiments by independent investigators appear to have demonstrated (1) that dried fish tapeworm powder causes a good blood response in patients with tapeworm anemia, (2) that it has no effect in patients with cryptogenic pernicious anemia, (3) that the response in both parallels the response to vitamin B_{12}, and (4) that tapeworm powder plus neutral gastric juice gives a good response in cryptogenetic pernicious anemia patients.

The problem and its solution are *per se* of great interest to all students of disease factors, but of particularly broad import is the revelation that a parasite derives its pathogenicity from a special capacity to deprive its host of an essential nutritional element. This is a new and specific area of investigation in the field of animal parasites.

Effects of Enheptin on Turkeys

Studies on the Chemotherapy of Enterohepatitis of Turkeys by Grumbles, Boney and Turk[1] of College Station, Texas, have revealed that 2-amino-5-nitrothiazole (enheptin T or enheptin), when fed to turkey hens at a concentration of 0.1% in the mash for 18 weeks, reduced the production, fertility, and hatchability of eggs, as well as the feed consumption and weight gains. At a level of 0.5%, there were no detectable adverse effects. These findings are disconcerting in the instance of a chemical that has proved particularly efficacious as a preventive of blackhead, but they should be reviewed in the light of recommendations for use. The higher level, namely 0.1%, is fed to check outbreaks, and then for only five to ten days. The present authors suggest that this level might be fed to laying hens for "approximately two weeks without causing adverse results". Of special significance, also, is the observation that the drug was considered to be of value only as a preventive and not as a cure, and that a closely related compound, namely, 2 acetylamino-nitrothiazole, also effective in the control of blackhead, was found to be without the adverse effects noted above.

Is Milk a Chemotherapeutic Agent?

Studies at the Liverpool School of Tropical Medicine[2] have shown that a milk diet suppresses the parasitaemia of blood-transmitted *Plasmodium berghei* infections of rats. It was concluded, moreover, that the effect was not due either to deficiency of iron or to adequacy of vitamins, but to a specific dietary factor in milk. Reference was made also to a recent lecture by Dr. Paul Gyorgy of the University of Pennsylvania in which experiments were described that indicated existence in milk of a factor protective against certain virus infections.

The discovery of an apparently antimalarial effect of milk (which was thought to be at once an explanation of the rarity of severe malaria among infants as well as the first demonstration of a dietary influence upon malaria) recalls to livestock parasitologists and veterinarians the admonition that early weaning of calves leads to increased haemonchosis, the variable and regional reliance upon milk flushes for controlling poultry coccidiosis, and the more recently advised milk feedings as a measure for controlling swine parasites. The pertinent literature and experience are extensive, but at no point heretofore has the suggestion been given, with substantiation, that milk contains a specific chemotherapeutic factor.

In final analysis, the effect of milk, whether direct or indirect, is but one facet of a broad practical problem that merits investigation, namely, the influence of nutritional factors upon disease and parasitism.

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[1] *Am. Jour. Vet. Res.*, 13:383, 386, 572, 1952.

[2] Maegraith, B. G., *et al.*, Suppression of Malaria (*P. berghei*) by Milk. *Brit. Med. Jour.*, no. 4799, 1382-1384, (Dec. 27), 1952.

CLINICAL REPORTS

Obstetrics In Small Heifers

G. W. BAYLES, D.V.M., Marion, Illinois

In my earlier days of practice, the problem of delivering calves from small, 14- and 15-month-old heifers was one of the most difficult. Many hours of hard work have been expended on these cases.

For the past three years, I have been using a Frank's calf puller on all obstetrical cases, approximately 500 in number. Perfection of this apparatus is the greatest step forward for the large animal practitioner since the model T Ford. Now, I do not know how I ever got along without this useful piece of equipment.

A system has been evolved for delivering these young heifers which reduces operating time to less than one hour. This is reported in the hope that it will be of benefit to the beginner; the seasoned obstetrician has probably used it many times.

In most cases, where a heifer has labored for several hours, front feet are presented with the head of the fetus turned to one side, or the head may be too large to pass through the pelvis and slides back into the uterus when traction is applied to the forelegs. In these cases, after cleaning up the heifer with antiseptic soap and water and lubricating the vaginal passage, I put a chain on the fetlock of one leg, doubled. I then hook up my calf puller and put traction on the one leg. One usually can retract this leg to the elbow joint. Then with a sharp knife, I split the skin from the carpal joint back toward the shoulder as far as possible. The skin is then cut completely around the leg. Traction is applied while the shoulder is skinned and separated from attachments. The whole forleg and shoulder will pull away and slip out easily with moderate traction.

The same procedure is used on the opposite front leg. This now gives the operator room to straighten the head which can often be brought to the outside without difficulty. A chain around the neck attached to the calf puller will accomplish delivery promptly in difficult cases.

Heifers seem no worse for the experience and usually make an uneventful recovery. The operation is gratifying to both the owner and veterinarian.

Demodectic Mange in Mink

V. C. R. WALKER,* D.V.M., D.V.P.H.,
Toronto, Canada

A mink was brought to the laboratory with a condition that closely resembled distemper. The feet were swollen, pads were thickened with serum and blood exuding, hair was denuded from feet. There were signs of swelling of the nose, and eyes were weeping with a crust formation around the lids similar to that observed in distemper.

Upon examining the feet, nose, and eyes closely, the lesions did not appear typical of distemper infection and a scraping was made from the affected areas. Microscopic examination revealed the presence of demodectic mange mites resembling the canine species. Few mites were observed and several fields

Fig. 1. Front feet of affected mink.

*Connaugh Medical Research Laboratories, University of Toronto.

Fig. 2. Illustrating crusts on nose and eyes of affected mink.

had to be searched before they could be demonstrated. The mink was destroyed and all precautions taken on the ranch to prevent spread from the one pen to other mink. A check four months later was made on the ranch, at which time one more case was revealed.

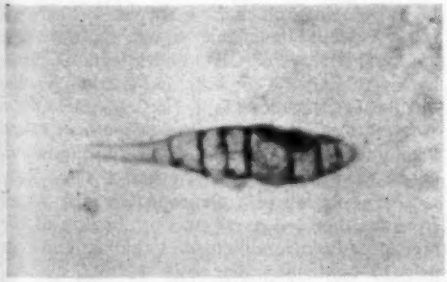

Fig. 3. Demodex species from the foot of affected mink.

As far as can be determined from literature, this is the first case of demodectic mange reported in the mink species. Fig. 1 illustrates the feet lesions, swelling of pads, and denuded areas; fig. 2, crust on the nose and around the eyes; fig. 3, demodectic mange mite. By the time the picture was taken, mites were slightly dehydrated but segmentations are quite clear. Measurements were 15u x 62u.

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Use of Streptokinase-Streptodornase in the Treatment of Canine Otitis Externa: A Case Report

LEO L. LIEBERMAN, D.V.M.,
New London, Connecticut

There is frequent incidence of ulcers in the external auditory canals of dogs suffering from chronic otitis externa. These cases are usually messy, malodorous, and refractory. The case report presented here describes the successful use of enzymatic debridement with streptokinase-streptodornase, varidase®, jelly, a new type of therapy. Although this is a report of a single case, it is believed worthy of attention.

Varidase is a preparation containing streptokinase and streptodornase, enzymes which are excreted by hemolytic streptococci into broth cultures during growth. The enzymes are separated from the bacteria, purified, filtered, and frozen and dried. While streptokinase appears to be active only upon the substrate of human plasminogen, streptodornase liquifies caseous or purulent exudates in both animals and man. The preparation is effective in clearing the site of infection, and thereby facilitates the action of antimicrobial forces, both humoral and antibiotic. The stable, desiccated preparation is suspended in distilled water at the time of use and added to carboxymethylcellulose jelly, a nonirritating, water-soluble preparation. The jelly preparation may be safely held for seven days if kept under refrigeration.

The subject is a nine-year-old, spayed female Springer Spaniel with chronic otitis of several years duration. The owner would occasionally present the dog to have the ears cleaned of foul-smelling exudate and to seek a treatment which he could continue at home. Many different antibiotic ointments had been used with limited success. The general condition of the animal was poor.

On April 8, 1953, the owner was persuaded to permit adequate treatment with enzymes. The ear canals were cleaned with ether, followed by tepid water. Ulcers in both ears

®Lederle Laboratories Division, American Cyanamid Company, Pearl River, N. Y.

were plainly visible without an otoscope, and measured from 0.5 to 1.5 cm. in diameter. The streptokinase-streptodornase jelly was applied to the canals with a straight teat cannula attached to a 10 cc. syringe. The remaining mixture was refrigerated and the ear canals refilled on the second and third days.

On April 11, the ears were again cleaned with ether and water. The ulcers had a bright pink color and healthy margins. The ear canal was treated with 10% silver nitrate solution and filled with bacitracin ointment. Bacitracin was one of the few antibiotics not previously used. In five days, the canals were cleaned, washed, and again treated with 10% silver nitrate solution, and refilled with bacitracin ointment. At this time the ulcers were one-third the original size at start of treatment. On April 19, antibiotic treatment was repeated and more improvement was noticed. After treatment on April 26, medication was discontinued.

On June 2, the ear canals were examined and found to be normal. The owner reported remarkable improvement in acuity of hearing. Hair coat and general condition were noticeably improved, in marked contrast to the animal's former appearance.

In this case, which had been refractory for several years, enzymatic debridement did a more thorough job than had theretofore been possible. This permitted effective antibacterial treatment, and stimulated normal healing processes, resulting in rapid tissue regeneration.

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Correction of Chronic Prolapse of Vagina and Cervix

DARWIN S. FRETZ, V.M.D.,
Lock Haven, Pennsylvania

The author attends numerous cows that have prolapsed the vagina and cervix both prepartum and postpartum. Most are treated uneventfully, especially if the prolapse occurs only several days or a week before parturition, or several days postpartum. The average case is given 8 to 10 cc. of spinal anesthetic, the prolapsed portions are cleaned thoroughly with soap, water, and antiseptics, and coated with sulfonamide powder. The prolapse is then replaced and secured by a purse-string suture. A curved tape needle with a two inch bandage for suture material is used. The first tape insertion is placed horizontally between the anus and dorsal commissure of the vulva. Other insertions are made vertically on both sides of the vulva, approximately 1 in. lateral to the lips. When completed, both ends of the suture will be at the ventral vulvar commissure. A single knot can then be tied to close the vulva to desired size. The knot can be completed with a bow so that the suture can easily be tightened or loosened. This suture can be left in place five to seven days postpartum, or until labor begins prepartum.

This procedure serves the average case without further trouble, but occasionally a cow will start to prolapse six to eight weeks before parturition, or will continue to prolapse after the first purse-string suture has been removed postpartum. The same procedure is followed with these cases; that is, spinal anesthesia, replacement, and purse-string suture. After the suture has been placed, however, a pair of scissors is used to start an incision 1½ in. from the ventral commissure of the vulva. The edges of the lips are cut to the dorsal commissure, removing approximately a ⅜ in. strip. The lips are then sutured together with interrupted sutures, leaving a 1 to 1½ in. opening at the ventral commissure for escape of urine or for artificial insemination. Sutures can be removed in seven to ten days. If this procedure is used prepartum the closure may be opened with scissors at time of parturition.

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Chronic Respiratory Disease a Distinct Entity

Chronic respiratory disease (CRD) of fowls is a relatively new name in poultry literature. It is very generally agreed that it is a distinct entity caused by a pleuropneumonia-like organism and can be differentiated from other respiratory diseases by the pathology produced in developing chicken embryos. There is good evidence available to substantiate the identical etiology of CRD and infectious sinusitis of turkeys. One accepted method in the diagnostic procedure is to inject infected tissues of chicks into the sinus of young poults. Production of typical sinusitis in poults is evidence that the chick donor had CRD. Subsequent isolation of a pleuropneumo-like agent from the diseased poult, and production of the typical pathological picture in chicken embryos help to confirm a diagnosis.

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A total of 105 are listed as members from the United States attending sessions of the International Veterinary Congress program in Stockholm, Sweden. This included 65 veterinarians and 40 ladies.

ABSTRACTS OF LITERATURE

Effect of Bacitracin Implants on Weight Gains

Holland and Swenson[14] report results of two experiments conducted on guinea pigs to determine if bacitracin implantations stimulated gain in weight in young males. Adequate controls were established and animals were subcutaneously injected with 1,000 units of bacitracin in pellet form. It was concluded that the bacitracin pellets did not alter weight gain of injected animals.

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Painless Death

D. Seneviratne, in his article entitled Euthanasia,[20] reviews various methods of humane canine destruction. " . . . it is earnestly hoped," says the author, "that the unwanted dog will not be denied, when the time arrives, the last humane service which we can render, and that is euthanasia."

Five methods of euthanasia are discussed: (1) Administration of poisons, anesthetics, or narcotics, (2) the lethal chamber, (3) drowning, (4) shooting, and (5) electrocution.

Poisons, anesthetics, or narcotics may be administered orally, by intrapulmonary, intraperitoneal, intracardiac, or intravenous injection. The author questions the practicability of these methods in event of mass destruction.

The lethal chamber is most popular in the lay mind because of its association with human euthanasia. Exhaust fumes and coal gas can be utilized.

Drowning is another method sometimes used in euthanasia. "Of all animals, the dog, with his wonderful sense of smell and his high intelligence, is the last suitable subject for destruction by drowning or in a lethal chamber by gaseous means."

Shooting is another method, effective and humane if carried out by trained hands.

As long ago as 1869, B. W. Richardson was experimenting with use of electricity as an aid to slaughter of food animals The idea is therefore not a new one. Electrical apparatus for humane destruction has been constructed in accordance with recommendations of the Euthanasia Committee of the National Veterinary Medical Association of England.

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Usefulness of Hyaluronidase

Because hyaluronidase has ability to enhance diffusion of fluids through tissues, it has found widespread application, particularly in human medicine[17]. A 25-page article in *Surgery* tersely sums the properties, principles of spreading effect, and clinical uses of the drug.

Use of salicylates, antihistamines, or estrogens, enhances the effectiveness of hyaluronidase. Use in established or spreading infections is controversial, and is contraindicated in malignancies.

Application in general surgery is in hypodermoclysis, infiltration and block anesthesia, lymphatic marking to facilitate dye dispersion in cancer surgery, and prevention of peritoneal adhesions. Patients with hydrocephalus have not responded to its use. Gallstone prevention is under study.

In minor surgery, indications are in local anesthesia, fluid dispersion, and hematoma resorption. In addition, there are similar indications in plastic surgery, orthopedics, ophthalmology, and urology.

Hyaluronidase has been effective in treatment of infertility, largely on an experimental basis, and in sinusitis to enhance penicillin penetration. The article concludes, "Hyaluronidase is one of several enzymes recently developed to enhance and supplement therapeutic measures. Its value has been well established in speeding the administration and absorption of parenteral fluids and drugs, in producing greater area and effectiveness of local infiltration anesthesia, in treating specific metabolic disorders, and in dispersing and enhancing diffusion of traumatic and pathologic fluid collections. Several special uses require further study and several suggestions for possible uses are presented."

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We can school ourselves — all of us — to express ourselves so that what we have to communicate can be quickly and easily apprehended by others within our profession.— *Vannevar Bush.*

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[14]Holland, L. A., and Swenson, M. J., Bacitracin Pellet Experiments with Guinea Pigs, Cir. 297, Kansas Agricultural Experiment Station, May 2, 1953.

[20]Seneviratne, D., Euthanasia. *Ceylon Jour. Vet. Sci.*, 9:22 (Dec.), 1952.

[17]Britton, R. C., Habif, D. V., Clinical Uses of Hyaluronidase. *Surgery*, 33:917 (June), 1953.

Exposure Technic in the Treatment of Burns

The exposure method for treatment of burns is not applicable to all cases. Burns in areas of severe laceration or fractures are exceptions. Patient cooperation is required if this method is decided upon.

Exposure technic is outlined as follows:[18]

1. Stabilization of the general condition of the patient by means of fluid therapy. This always takes precedence over local care. Lactated Ringer's solution is preferred.

2. Cleansing the burned area with large volumes of water; debridement under sedation. Aseptic precautions are unnecessary. Crust forms in 24 to 72 hours.

3. Administration of parenteral penicillin or antibiotics of choice for the first five days. No antibiotics are applied locally.

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Incidence of Intervertebral Disc Protrusions in Dogs

Canine intervertebral disc protrusions have been subjected to intensive study by Hoerlein[19]. His work has shown that pathology of protrusions is variable, that incidence is equally divided between the sexes. Dogs three years of age are most frequently affected. Some of Hoerlein's subjects revealed disc pathology at autopsy (41.5%), but many had presented no demonstrable symptoms during life.

Discs most frequently affected were the last thoracic and the first lumbar. Metaplasia to cartilaginous form, and senile disc dehydration often precede the exciting cause.

Various clinical symptoms are evidenced in disc cases, and pain is one of these. By utilizing cutaneous pain sensations, it is possible to locate the lesion. Twenty percent of the cases have had previous attacks, and 92% have concurrent symptoms such as bowel retention and urinary continence.

The most practical contrast medium for myelography was found to be pantopaque*. It was of immense value in establishing correct diagnosis of protrusion site in selected cases.

[18]—Exposure—An Older Idea Has New Merit in Treating Burns. *Jour. Am. Med. Assn.*, 152:21 (May 2), 1953.

[19]Hoerlein, B. F., Intervertebral Disc Protrusions in the Dog. *Am. Jour. Vet. Res.*, 14:260 (Apr.), 1953.

*Lafayette Pharmacal Co., Lafayette, Ind.

Talc Granuloma

Talc is a hydrous magnesium silicate which can produce pseudotuberculous, noncaseating granulomatous lesions in the form of chronic granulomas, or foreign body reactions[16]. It was first reported responsible for postoperative complications in 1933, when difficulties arose from its use as dusting powder for surgical rubber equipment. Powdered rubber tubing used as drains or perforated rubber gloves may contaminate surgical wounds. Periods of years may intervene before appearance of symptoms, which then develop rapidly.

Experimental talc granulomas were produced by Lichtman *et al.* in 1946, and many cases of adhesions have been attributed to the use of talc. In addition to sequels of granulomas and adhesions, general peritonitis, bowel obstruction, and persistently draining sinuses have been known to result.

Polarizing light reveals talc as birefringent crystals. Cornstarch has been suggested as a substitute.

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Erysipeloid Infection

The *British Medical Journal* recently considered the manifestations of swine erysipelas in man, and its treatment[15].

The condition is known as erysipeloid and almost invariably arises on the finger or hand. Lesions resemble those of streptococcal erysipelas in that they are hard, raised, and inflammed. The lesion is dark bluish; affected skin has a smooth, shiny appearance; it produces a burning sensation with pronounced itching. If untreated, the disease persists for weeks. It is rarely serious, but complicating endocarditis and arthritis sometimes occur.

Erysipelothrix rhusiopathiae, the infecting organism, is highly sensitive to penicillin.

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Commercial phenolized rabies vaccine (20% brain tissue-caprine origin containing 0.5% phenol) was well tolerated by a group of 17 cats. Dose administered in a clinical study by Scheidy *et al*[21] was 3 to 5 ml.

[16]Baar, F., A Case of Talc Granuloma Simulating Carcinoma. *Brit. Med. Jour.*, May 23, 1953, p. 1146.

[15]———, Swine Erysipelas in Man. *Brit. Med. Jour.*, May 23, 1953, p. 1177.

[21]Scheidy, S. F., *et al.*, Phenolized Rabies Vaccine in Cats. *Jour. Am. Vet. Med. Assn.*, 123:330 (Oct.), 1953.

BOOK REVIEWS

Books reviewed in this department and any other books, if available, may be obtained by remitting the published price to the Book Department, Veterinary Medicine, Suite 803 Livestock Exchange Building, Kansas City 15, Missouri.

THE DISTEMPER COMPLEX by *Leon F. Whitney* and *George D. Whitney*. 219 pages. Practical Science Publishing Company, Orange, Conn., publishers.—Price $5.

This book is undeniably well-worded, timely as distemper always is, and permeated with personal observations, charts, tables, and recommendations by the authors.

The front inside cover of the book presents a large comprehensive chart containing much information pertinent to what the Whitneys term "the distemper complex." Chapter 2 presents some rather basic definitions and terminologies: intravenous — into a vein; intramuscular — into a muscle; upper respiratory—breathing. This over-explanatory approach suggests that the authors are attempting to appeal to owners; the brochure announcing the work states that it is "a new text for everyone interested in breeding dogs."

The title of chapter 3, Epilepsy, would indicate an attempt to dramatize material for breeders. Certainly the term is ill-advised in veterinary medicine; epileptiform, epileptoid, or epilepsy-like being more appropriate. No mention of epilepsy is made in subsequent pages of the chapter, other than a quoted definition of the term. The chapter head is not correlated with contained material, i.e., encephalitis, myelitis, and meningitis.

The authors are admirable in their unflinching presentations of the complex as they have observed it and in their frank admission of insufficient knowledge of some of the disease entities. Some may question the inclusion of house dog disease and claim that the authors are referring to kennel cough or occult distemper. Others may feel that discussions of coccidiosis, toxoplasmosis, salmon poisoning, and leptospirosis have no claim on the title.

The bibliography is copious, consisting of 39 pages of references.

Not all veterinarians will agree with inclusion of all diseases mentioned, but most will agree that a masterful attempt has been made to draw together much material, often contradictory and controversial, and set it down in plain language. The book stimulates thought.

VETERINARY DRUG ENCYCLOPEDIA AND THERAPEUTIC INDEX. A listing of new veterinary drugs, biologicals, and foods of American manufacturers, by *Hadley C. Stephenson*, D.V.M., professor of therapeutics and small animal diseases, Cornell University, Ithaca, N. Y., and *Stanley G. Mittelstaedt*, Ph.D., assistant dean and professor of pharmacy, University of Arkansas, Little Rock. 141 pages. Drug Publications, Inc., New York, publishers, 1953.

Two editions of Veterinary Drug Encyclopedia have been published. One carries seven pages of advertising and has been distributed free of charge to veterinarians in the United States. The other edition is without advertising and is offered to veterinarians in Canada and abroad for $6.

The authors admit in their forward that "The products of some companies are not described because of their hesitancy in cooperating in this first edition." This constitutes a fault of omission and, although the finished product does not reflect the brilliance of its conception, the authors are to be complimented for taking the first step in producing a work that will undoubtedly become valuable in subsequent editions.

* * *

STEDMAN'S MEDICAL DICTIONARY, prepared by *Norman Burke Taylor*, V.D., M.D., F.R.S., F.R.C.S., University of Western Ontario, Canada, and *Lt. Col. Allen Ellsworth Taylor*, D.S.O., M.A. 1605 pages, 600 text figures, 22 plates, semiflexible binding, thumb-index, 18th ed. The Williams and Wilkins Company, Baltimore, publishers, 1953. — Price $11.50.

Stedman's Medical Dictionary has been an accepted work through 17 editions. The new edition has been fully revised and reset to include more than 3,000 new terms.

Special attention is given to medical etymology and selection of type. The latter aids in rapid location of references. Bold type is used in alphabetical listing; explanations are brief and clear. Running heads at both upper corners of every page provide an excellent guide. The book is securely bound in semiflexible green cloth stamped with gold.

ESSENTIALS OF PHYSIOLOGICAL CHEMISTRY, a text by *Arthur K. Anderson*, B.S., M.S., Ph.D., professor of physiological chemistry, Pennsylvania State College. 480 pages, 42 figures, numerous formulae, charts, graphs, and review questions. 4th edition. John Wiley and Sons, Inc., New York, publishers, 1953.—Price $5.

This book is designed to present basic biochemical knowledge to readers with backgrounds limited in chemistry and biology. The chemistry of proteins, carbohydrates, and lipids is emphasized. Digestion, absorption, metabolism, calorimetry, and composition of tissue and blood are discussed in understandable style. There are 21 chapters in all, the concluding ones being devoted to chemotherapy and antibiotics, urine, endocrine organs, and vitamins.

Essentials of Physiological Chemistry has remained a popular text since first publication in 1935. It is widely used in universities today.

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A STUDY OF ANTIMETABOLITES, by *D. W. Woolley*, Ph.D., member, Rockefeller Institute for Medical Research. 269 pages, tables, figures. John Wiley and Sons, Inc., New York, publishers, 1952.—Price $5.

Functions of essential metabolic substances can be antagonized by presence of other closely related compounds. These are termed antimetabolites. Doctor Woolley examines representative antimetabolites—enzymes, hormones, vitamins — enabling the advanced reader to grasp underlying principles which govern actions in the animal body. Vitamin K analogs, antagonism between progesterone and estrogen, enzymatic and nutrilite adversities are systematically discussed.

The book is a technical and revelatory work likely to appeal to the advanced scholar.

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TEXTBOOK OF MEAT INSPECTION. A text and reference by *Horace Thornton*, B.V. Sc., M.R.C.V.S., D.V.H., F.R.S.I. 646 pages, 260 figures, four color plates, four tables. 2nd edition. Alexander Eger, Inc., Chicago, publishers, 1953. — Price $10.50.

The first edition of Thornton's Meat Inspection was submitted to thorough review at time of publication in 1949 (*Vet. Med.*, 45:342 [Aug.], 1950). The present edition retains all of the virtues of the first, and is a noteworthy contribution to veterinary literature.

The author is an eminent meat inspection authority, as well as a practicing veterinary inspection officer. His varied experiences enable his to describe not only English practices, but those of the Continent, Argentina, and the United States.

Inspection of various classes and species of animals is adequately considered. The chapter on comparative anatomy is commendable. Tularemia of rabbits is not considered, a serious omission in view of its prevalence in this country. A bibliography is not included.

Issuance of a second edition so close upon the first, as well as a reduction in price, testifies to the wide acceptance of the work.

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THE GENETICS OF THE DOG, by *Marca Burns*, B.Sc. 122 pages, 12 plates, three figures. Commonwealth Agricultural Bureaux, Farnham Royal, Slough Bucks, England, publishers, 1953.—Price $2.25 (approx.).

Information contained in The Genetics of the Dog is neither strikingly recent in origin nor revelatory; the authoress does not pretend it to be so. The book admittedly is a crystallization and congregation of the works of various authors in the fields of canine genetics and reproduction. Terminology is comprehensible to both the educated lay reader and the interested veterinary cynologist.

Nine chapters serve to introduce the Mendelian theory, physiological pecularities, behavior and mental attributes, successful breeding systems, and other pertinent topics.

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"Where the empiric usually has the advantage over the young graduate is in the art of handling people. Most of them are past masters at this, and the young practitioner, as a rule, does not give this part of the business much attention. He relies too much on his actual professional ability," *Vet. Med.*, 9:794 (Nov.), 1914.

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Science News Letter suggests that "when those fish you know are there refuse to bite, try a little scientific investigation." Examine the stomach contents of one or more of those you do manage to catch for a clue to what the fish may be feeding on at the time.

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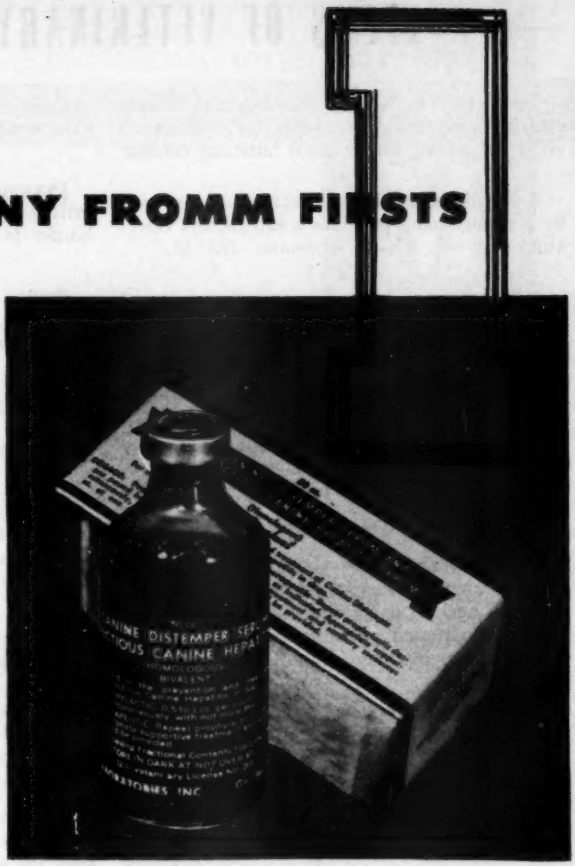

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ITEMS OF VETERINARY INTEREST

Tests at the Kansas Experiment Station clearly demonstrate the need for and advisability of adding salt to lamb fattening rations.

▼

A length of stockinette secured at one end by a rubber band provides a satisfactory operating cap.—*C. Edwin Hofmann, D.V.M.*

▼

Inflammatory changes in the stifle joint of bulls, gonitis, is probably one of the most important reasons these animals are sold for slaughter.

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Of the 42 states in which vesicular exanthema of swine was diagnosed last year, the legislative bodies of 41 have enacted laws requiring that garbage be cooked prior to feeding hogs.

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"You never outgrow your need for milk", the oft-repeated line in television promotion of the American dairy interests, is expected to result in increased consumption of fluid milk, thereby balancing losses in butter consumption.

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A major development of the past ten years, the significance of which must not be underestimated, is the growing familiarity with medical matters on the part of the man in the street.—*Harry J. Loynd.*

▼

If conditions are favorable for propagation of the vampire bat in southern and southwestern United States, we may reasonably expect invasion by these animals. — *L. E. Starr, D.V.M., Atlanta, Ga.*

▼

The great scientist is he whose work relates no fact not authenticated by sufficient testimony. To be a respectable experimenter, to dabble here and there, to interpret this from that . . . all this is easy. But to be a great scientist is perhaps the rarest of intellectual distinctions.

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Q-fever, identified only 15 years ago, is widespread on nearly every continent of the world. The "Q" is variously said to stand for "Queensland", where the disease was first recognized, or for "query" in view of its many unknowns. The disease is common in southern and central Europe, Australia, and the United States. It is not known to occur in the Scandinavian region.

Cellulose sponges are claimed to be better than towels for drying dogs after bathing.

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Dourine was diagnosed in a horse that drifted north across the Mexico-United States border in California.

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Poultry and poultry products constitute 11.7% of the total income from livestock operations in Iowa.

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Conflicting reports appear regarding the value of detergents as growth-stimulators in tests on both swine and chickens.

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During the period 1945 to 1952, over one-third (186 of 458) known cases of psittacosis in the United States were attributable to exposure to caged, infected parakeets and parrots.

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Floor litter management in laying and brooder houses is a controversial subject mostly from misunderstanding and misinterpretation of facts developed by research. There is much confusion as to what constitutes built-up (compost) litter.

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Some veterinarians closely associated with the swine industry have expressed concern over the apparent reduction in the percentage of the 1953 pig crop protected against hog cholera. Keeping susceptible swine for breeding is not good judgment.

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Intramuscular injections of cortisone have been followed by relief of pain and symptoms of arthritis in horses and cattle. The doses recommended range from 0.5 to 0.75 gm. daily for two to three days. Intra-articular or intrabursal injections of hydrocortisone have proved effective in rheumatoid and arthritic conditions of horses and dogs.

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The original Morgan, "Figure", was brought to the village of Randolph, Vt., from Springfield, Mass., in 1778 by Justice Morgan. Renamed "Justice", he was sold to Levi Been of Chelsea, Vt., many years before Mr. Morgan's death in 1798. This prince of steeds died there in 1821, 32 years of age, from a kick by another horse.